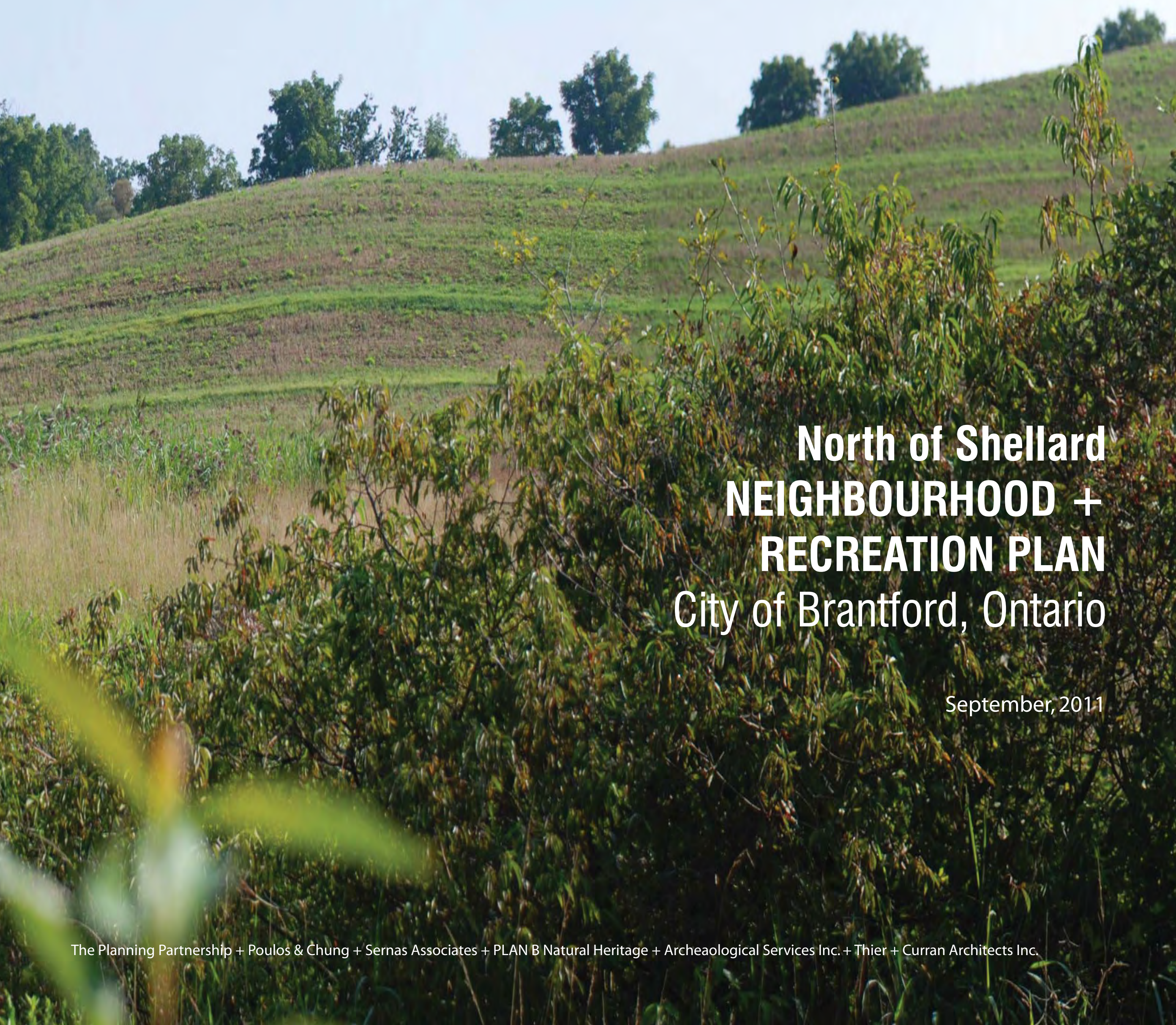

North of Shellard
NEIGHBOURHOOD + RECREATION PLAN
City of Brantford, Ontario

September, 2011

The Planning Partnership + Poulos & Chung + Sernas Associates + PLAN B Natural Heritage + Archeaological Services Inc. + Thier + Curran Architects Inc.

CITY OF BRANTFORD

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NORTH of SHELLARD
NEIGHBOURHOOD +
RECREATION PLAN

Report Prepared for The City of Brantford
by The Planning Partnership

North of Shellard
NEIGHBOURHOOD +
RECREATION PLAN
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Part 1
INTRODUCTION

1.1 Purpose

The purpose of the North of Shellard Neighbourhood and Recreation Plan is to complete a Neighbourhood Plan for a portion of lands located within the southwest area of the City of Brantford; specifically, north of Shellard Lane within an area identified as "Neighbourhood Two" of the West of Conklin Secondary Plan area. As part of this process, the City also requires the completion of a facility site design for a recreation/sportsfield complex to be located within this planning area.

Ultimately, this study will result in a Neighbourhood Master Plan and a Recreational Centre Master Plan, and accompanying development and design guidelines to guide the development of the North of Shellard Community.

1.2 Study Area & Context

The study area is located in the southwest area of the City of Brantford, north of Shellard Lane within an area identified as "Neighbourhood Two" of the West of Conklin Secondary Plan area (see Figure 1). The area is bounded on the east by a recent residential development of predominantly single-detached houses, on the north and west by the former T. H. & B. rail line, and to the south by Shellard Lane. The entire study area is comprised of five land owners, of which the largest parcel of land is owned by the City.

Together, the study area is approximately 94 hectares (230 acres) in size, and is presently comprised of agricultural land and numerous significant environmental features further described in Section *2.2 Environmental Inventory*.

Figure 1. Context map showing location of Study Area

1.3 Study Process

The project has a phased approach, and undertakes a collaborative three-phased process in an open forum, involving landowners, local sports groups, community organizations, residential property owners, City staff, as well as local political representatives. The phases include:

- Phase 1 -
  Review background material and current data, and prepare preliminary environmental and engineering analysis;

- Phase 2 -
  Develop the Neighbourhood and Recreational structure plan through a collaborative design workshop; and,

- Phase 3 -
  Finalize the preferred community and recreation/sportsfield complex master plan.

1.4 Report Structure

This report is organized into the following sections:

Part 1 INTRODUCTION

This section of the report provides background information and highlights the purpose of the study.

Part 2 TECHNICAL BACKGROUND

The Technical Background Report provides an overview for the North of Shellard Community and Recreational Master Plan. Prior to the workshop, the team:

- Highlighted issues that have been identified by the consultant team;
- Reviewed the opportunities and constraints provided by the site, design givens, and policy directives; and,
- Provided a synopsis of the background work that commenced June 2010 and led up to the workshops that were held in October 2010. Initial findings for the study area are included in this section with respect to community design, land use planning policy, the environment, transportation, servicing, archaeology, and sustainability.

Part 3 DESIGN WORKSHOP

Part three of this report provides a summary of the proceedings and outcomes from the Workshop, and describes the design options.

Part 4 THE PREFERRED PLAN

Part four of this report introduces the Community Vision for the study area based on the urban design principles established in current policy.

The Community Vision is then further explained by analyzing each one of its community structuring elements: land use, built form and the public realm.

Part 5 URBAN & ARCHITECTURAL GUIDELINES

The purpose of the Urban Design and Architectural Guidelines is to provide City staff and the development industry a set of site specific development guidelines that will ensure the delivery of the preferred master plan vision.

The guidelines describe the City of Brantford's expectations with respect to the character, quality, and form of development in the North of Shellard neighbourhood and recreation community. The guidelines also provide City staff with an objective and consistent evaluation framework to assess development applications.

Part 2
TECHNICAL BACKGROUND

2.1 Urban Design & Planning Context

2.1.1 OPPORTUNITIES & CONSTRAINTS

Inherent in its site location and physical characteristics, policy directives, and environmental features, the Study Area presents a number of design opportunities and constraints in the physical features of the site (see Figure 2).

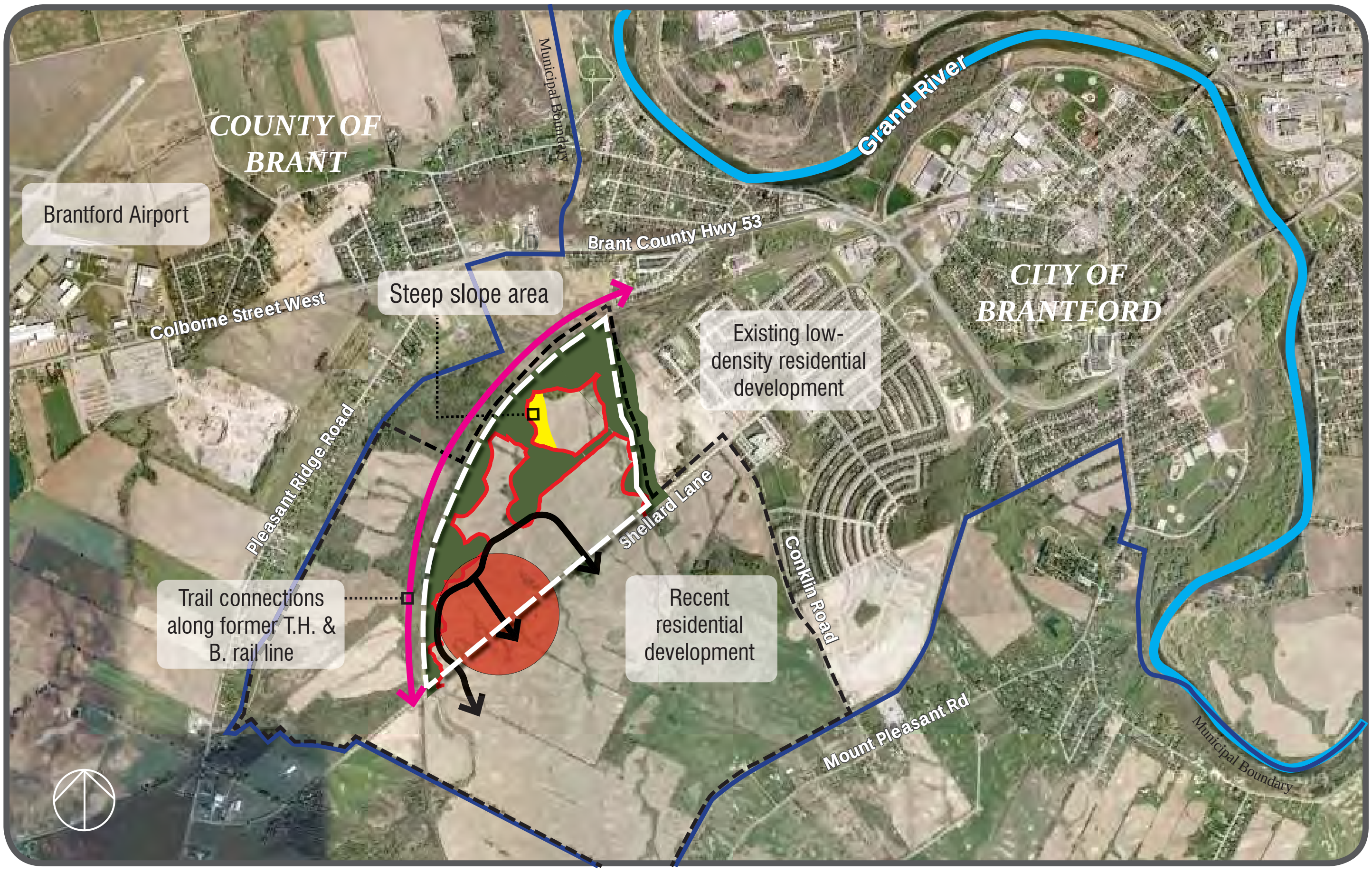
A. Environmental constraints denote the development limits within the study area. These limits are defined by the current limits of the natural heritage system, tree drip line, floodplain, provincially significant wetlands, and their associated setback buffers. In order to determine the development limits, a combination of 30 and 15 metre setback buffers have been overlaid onto the existing environmental features boundary. Please refer to Section 2.2 for further detail.

B. Site topography is the natural rolling land and change in elevation of the Study Area. Creating interesting land forms and view corridors within and around the Study Area, through terracing or otherwise, is an immense design opportunity for this neighbourhood. The challenge is to preserve as much of the natural topography of the site as possible (for example, through minimal soil movement) while fulfilling the development program of buildings and sports fields.

C. Design givens/pre-conditions/determinants are a set of pre-determined design elements already laid out in the West of Conklin Secondary Plan. For example, the location and spacing of roads intersecting Shellard Lane, the alignment of the collector road system, as well as existing land use designations are set out in the Secondary Plan.

Existing site photographs, showing vegetation and naturla rolling topography of the Study Area

Figure2. Design opportunities and constraints



Legend

- Village Centre
- Collector Road
- Steep slope area
- Former T.H. & B. Rail Line
- Development limit
- Environmentally Significant Area within Study Area
- Study Area
- West of Conklin Secondary Plan Area boundary
- Municipal boundary

D. Role of the Village Centre, as identified in the West of Conklin Secondary Plan.

The Study Area is governed by planning policies which inform a land use and built form framework for future development within the Study Area.

In Schedule 'B', of the Secondary Plan, the south-west portion of the Study Area located immediately north of Shellard Lane is designated *Village Centre*, and is the primary focus of the Secondary Plan Area.

The Village Centre land use designation permits a range of uses including institutional, retail and service commercial, recreational and cultural uses, and will provide a mix of higher density residential housing types and mixed-use buildings, ranging from 3 to 10 storeys.

Essentially, the Village Centre designation provides immense opportunities for developing a strong focus not only for the immediate neighbourhood, but also for the entire Secondary Plan Area.

The following is an excerpt from the West of Conklin Secondary Plan, and highlights the importance of the Village Centre in providing a central focus for the Study Area.

"19.5.3 Village Centre Designation

.1 The Village Centre is the primary focus of the Secondary Plan Area. The Village Centre will incorporate institutional, retail and service commercial, recreational and cultural uses as well as ground-related housing and residential apartment buildings within a mixed use context. Development in the Village Centre designation may be in either single use and/or mixed use buildings.

.2 The Village Centre may include a range of medium and higher density housing types, a Secondary School and/or an Elementary School, a Neighbourhood Park and a range of institutional, retail, personal service and business activity intended to serve the entire West of Conklin Secondary Plan Area:

.1 permitted residential building types include street, block or stacked townhouses, small plex-type (e.g. quattruplex) multiple unit buildings and apartment buildings. Apartment units may be permitted in either standalone residential buildings or above the ground floor in a mixed use building. Single-detached and semi-detached housing units are specifically not permitted within the Village Centre designation;

.2 retail and service commercial development shall only be permitted on the ground floor of a mixed use building. Individual retail and service commercial uses shall generally be limited in size to a maximum of approximately 500 square metres each; and,

.3 the following retail and service commercial land uses are specifically prohibited:

.1 drive-through establishment of any type;

.2 any use that requires the outdoor display or storage of goods, with the exception of a seasonal garden centre, associated with another permitted use;

.3 nightclubs or banquet halls;

.4 all automobile related uses (sales, service, gas bars, car washes);

.5 amusement arcades;

.6 places of entertainment;

.7 adult live entertainment parlour;

.8 body rub parlour; and,

.9 taxi establishments.

.3 Buildings heights shall be within a range of 3 to 8 storeys, or between 8.0 to 26.0 metres, whichever is less. Where sites abut Shellard Lane, building heights shall be within a range of 3 to 10 storeys, or between 8.0 to 32.0 metres, whichever is less.

.4 The Neighbourhood Park required within the Village Centre shall be a minimum of 0.75 hectares in size, and shall be surrounded on at least two sides, and preferably three sides by public roads. The design of the Neighbourhood Park shall be articulated in the required Neighbourhood Design Plan. The Neighbourhood Park is to be accepted as part of the parkland dedication required under the Planning Act.

.5 All development within the Village Centre designation shall be planned comprehensively on the basis of the required Neighbourhood Design Plan. The required Neighbourhood Design Plan and the implementing zoning by-law shall establish and articulate the range of uses and the distribution of such uses within the Village Centre designation.

.6 All development within the Village Centre designation will address the road, and garage doors/service facilities shall not dominate the view of the streetscape. Front and exterior side yard porches shall be encouraged on all ground-related residential units. The implementing zoning by-law shall include details with respect to building within zones for front and exterior side yards, for the various anticipated development types and forms. Special provisions with respect to porches for the ground-related residential uses shall also be included in the by-law.

.7 No individual, direct access shall be permitted for any development lot within the Village Centre designation that abuts Shellard Lane and/or any Major or Minor Collector Road. Parking lots shall not be located within any front yard within the Village Centre designation. Reverse frontage development shall not be permitted within the Village Centre designation."

2.1.2 DESIGN PRINCIPLES

The development of the North of Shellard Neighbourhood & Recreation Plan will be directed by the design principles of the West of Conklin Secondary Plan. These design principles are applicable to the entire Secondary Plan area and are summarized with image precedents below:

Focus

1. The community will be multi-centred and will be comprised of three neighbourhoods.

2. Each neighbourhood should have identifiable edges and a distinct higher intensity, mixed use focus that is within a 5 minute walk of the majority of residents.

Greenlands

1. A variety of parks for an array of recreation and leisure activities will be provided.

2. Parks, open space, natural heritage features and storm water management facilities shall form a connected greenlands system.

.3 Storm water management facilities shall be designed as landscape amenities.

Connections/Linkages

1. The community will have a continuous system of trails for walking and cycling.
2. Roads will provide a network that is appealing for pedestrians, cyclists, and transit facilities, as well as cars.
3. Pedestrian connections adjacent to significant natural heritage features shall be planned to anticipate use and to avoid impact on the features and their environmental functions.
4. All roads will be designed as important components of the public realm. All roads will be lined with trees and have sidewalks in accordance with current municipal standards.
5. The community and its neighbourhoods will be linked to the existing built areas in Brantford.
6. Community design will be based on a modified grid system to enable ease of access and improved connections through the community.

Uses

1. A diversity of housing types from single detached houses to apartment buildings will be provided to achieve densities anticipated in municipal and provincial policy.

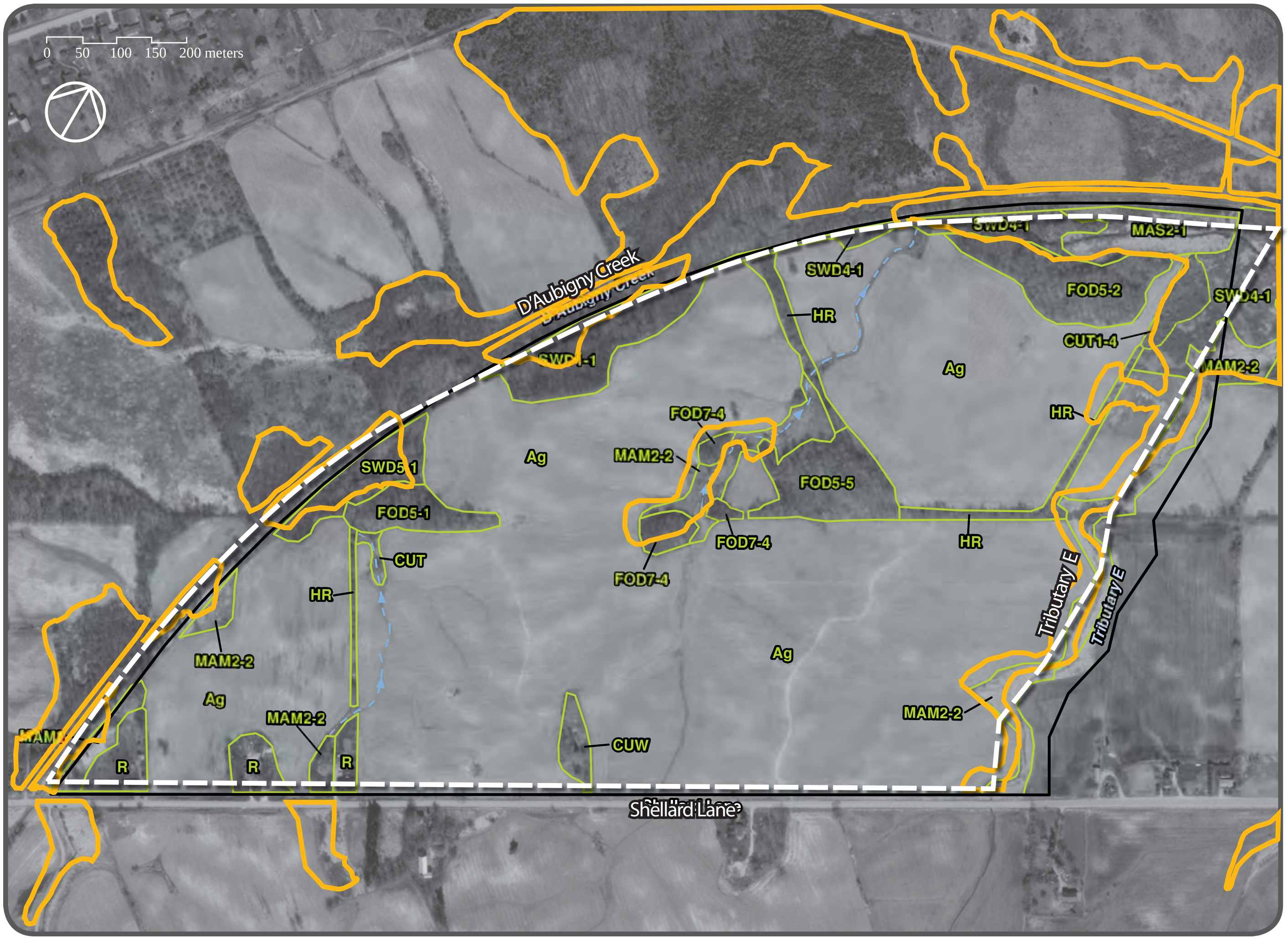
2. A density of development that will help to support transit and commercial activity will be planned.

3. A mix of uses will be planned so that people can have the choice to work, shop and enjoy community facilities in the community.

Infrastructure

1. Municipal services shall be provided in a cost effective and efficient manner.

Figure 3. Existing Natural Features



Legend

	Study Area
	Drainage Swale
	Ecological Land Classification Community Boundary
FOD5-1	Dry-Fresh Sugar Maple Deciduous Forest Type
FOD5-2	Dry-Fresh Sugar Maple-Beech Deciduous Forest Type
FOD5-5	Dry-Fresh Sugar Maple-Hickory Deciduous Forest Type
FOD7-4	Fresh-Moist Black Walnut Lowland Deciduous Forest Type
CUT	Cultural Thicket
CUT1-4	Gray Dogwood Cultural Thicket Type
CUW	Cultural Woodland/Remnant Homestead
SWD1-1	Swamp White Oak Mineral Deciduous Swamp Type
SWD4-1	Willow Mineral Deciduous Swamp Type
SWD5-1	Black Ash Organic Deciduous Samp Type
MAM2	Mineral Meadow Marsh Ecosite
MAM2-2	Reed Canary Grass Mineral Meadow Marsh Type
MAS2-1	Cattail Mineral Shallow Marsh Type
Ag	Agricultural
R	Residential

2.2 Environmental Inventory

2.2.1 OVERVIEW

The study area is a mosaic of agricultural land interspersed with field border hedgerows, cultural woodlands and thickets, deciduous woodlots, drainage swales, and forest and wetland communities associated with the D'Aubigny Creek riparian corridor. The wetlands within the study area are part of the D'Aubigny Creek Provincially Significant Wetland (PSW) Complex. The wetlands consist of cattail and reed canary grass marsh, willow/dogwood thicket swamp, and deciduous/mixed swamp. Deciduous forest associations (oak, maple, beech, hickory, ash, and cherry association) occur along the valley slopes and contiguous tableland areas. The upland and wetland communities associated with the D'Aubigny Creek valleylands are part of a larger core natural area and corridor that provides a linkage connection between the D'Aubigny Creek Swamp ESA to the south and the Grand River valley to the northwest.

D'Aubigny Creek is a permanent coldwater stream that supports a variety of fish species including habitat for brook, brown and rainbow trout. Protection of the groundwater recharge/discharge regime within the study area and larger landscape setting is of paramount importance to the protection of the ecological integrity and function of the D'Aubigny Creek ecosystem. Tributary E to D'Aubigny Creek, located along the eastern edge of the study area, supports permanent flow and a warm water fish community. Wetlands associated with Tributary E are part of the D'Aubigny Creek PSW.

A detailed natural heritage inventory and analysis of the subject lands was previously completed as part of the West of Conklin Secondary Plan, which forms the basis for the natural heritage system proposed herein for the North of Shellard Neighbourhood Plan. Additional information on the environmental characteristics of the study area can be found in the Natural Heritage Existing Conditions and Assessment Report (LGL Limited 2007).

Existing conditions within the study area are mapped in Figure 3.

2.2.2 ENVIRONMENTAL OPPORTUNITIES & CONSTRAINTS

The study area is mainly comprised of agricultural land on rolling, hummocky topography. Natural environment features are mainly confined to the D'Aubigny Creek corridor, Tributary E and a mosaic of forest, wetland and hedgerows located in the centre of the study area. The key elements of the natural heritage system for the North of Shellard Neighbourhood plan are as follows:

- D'Aubigny Creek;
- Tributary E;
- D'Aubigny Creek PSW;
- Floodplain areas;
- Upland forest and cultural vegetation contiguous with the D'Aubigny Creek riparian corridor;
- Central woodlot/wetland and hedgerow connections to D'Aubigny Creek and Tributary E);
- Drainage swale and hedgerow connection between PSW south of Shellard Lane and D'Aubigny Creek corridor; and,
- Buffers.

Figure 4. Natural Heritage System

The recommended natural heritage system is illustrated in Figure 4. The system incorporates 30 m buffers (as per the recommendations in the West of Conklin Secondary Plan) from the D'Aubigny Creek corridor (as defined as the greater of stream channel, wetland boundary or dripline of contiguous upland vegetation). A 10 m dripline buffer from the edge of the central woodlot and hedgerows has also been incorporated into the natural heritage system. Floodplain areas have also been taken into account in determining the location of the natural heritage system. Although a 15 m warm water fishery setback was previously recommended for Tributary E, for consistency a conservative setback of 30 m was applied to this watercourse, and the D'Aubigny Creek system as a whole.

As part of the design exercise for the neighbourhood park, the limits of the natural heritage system were staked in the field with GRCA staff and surveyed. The surveyed boundary will be used to refine the park and neighbourhood plan concepts. Given the significance and sensitivity of the natural environment features within the study area, appropriate stormwater and groundwater management measures are recommended to maintain and enhance water quality, sustain stream baseflow/temperature and protect wetland hydrology. Low impact development measures for stormwater management such as bio-swales, at-source infiltration of runoff, wetland storm ponds, and infiltration/cooling trench outlets, are recommended to protect the aquatic and wetland components of the natural heritage system.

Naturalization of the buffers and storm ponds with native species is recommended to enhance the function and integrity of the natural heritage system and increase its resilience to development of the landscape. In terms of trails and trail connections, sensitive wetland and upland areas within the study area should be avoided. Final trail locations should be reviewed in the field with a qualified ecologist to determine the most appropriate route. Future residents of the community should be informed of the significance/ sensitivity of the natural environment and appropriate stewardship behaviour. This can be accomplished through a variety of ways including; interpretative signage at trail heads, homeowner's handouts, school programs, and trail/nature watch volunteers.

As part of the neighbourhood park design exercise, an Environmental Impact Study (EIS) will be completed. The EIS will provide a detailed description of the natural environment, evaluate potential impacts and identify appropriate mitigating measures.

Figure 5. Existing and Planned Road Improvements

Figure 6. Existing Transit Service

2.3 Transportation

2.3.1 INTRODUCTION

The following is an outline of the current transportation plans and policies. The following resources were consulted when compiling this background report:

- The Official Plan of the City of Brantford (2009)
- City of Brantford Transportation Master Plan (2007)
- Southwest Brantford West of Conklin Secondary Plan – Master Servicing and Traffic Report (2008)
- Transit and Trail sections of City's Website (2010)

The proposed development area is bordered by Shellard Lane, classified as a major collector with two lanes (one in each direction). It is a designated truck route with a speed limit of 50 kph. Shellard Lane is planned to be widened to 4-lanes from 2-lanes (which will change its classification to an arterial) between the BSAR and the western city limits. This is planned to occur in two stages as shown on Figure 5 :

- Widening between Conklin & Veterans Memorial Parkway (scheduled to be completed between 2012 & 2016), and
- Widening between Conklin & western city limits (scheduled to be completed between 2017 & 2021)
- Design of Shellard's Lane right of way improvements are subject to a Class EA to be conducted in 2011/2012.

2.3.2 AREA TRANSIT

The study area is not currently serviced by transit. The closest transit service circulates on Shellard Lane up to McGuiness Drive (see Figure 6). This route services the Flanders Drive and McGuiness Drive neighbourhoods (both just east of the site) 7 days a week. Brantford Transit will have to be consulted to determine an appropriate route to service the area. Current policies require that the planned development place higher densities along collectors to support and encourage transit usage. The City wants to double its transit modal split and nearly double its Walk/Cycle modal split by 2031. The City has developed modal split goals which are as follows:

Mode of Travel	Existing Mode Split (%)	2016 Target Mode Split (%)	2031 Target Mode Split (%)
Auto (Driver & Passenger)	90%	87%	83%
Transit	3%	4%	6%
Walk/Cycle	6%	8%	10%
Other	1%	1%	1%
Total	100%	100%	100%

2.3.3 PREVIOUS STUDY WORK

URS Canada Ltd. completed a report entitled "Southwest Brantford West of Conklin Secondary Plan-Master Servicing and Traffic Report". This report examined the current level of service along Shellard Lane. This report determined that the planned expansion of Shellard Lane (to 4 lanes) and the planned developments (including the development North of Shellard) do not cause adverse traffic conditions on Shellard or the surrounding area (see Figures 7 and 8). The West of Conklin report assumed the following total development statistics for both South and North of Shellard:

- 1750 low density units;
- 650 med/high density units;
- 15.5 ha for neighbourhood centre; and,
- 270 employees

This resulted in the following trip generation totals shown in the chart below (see Table 1).

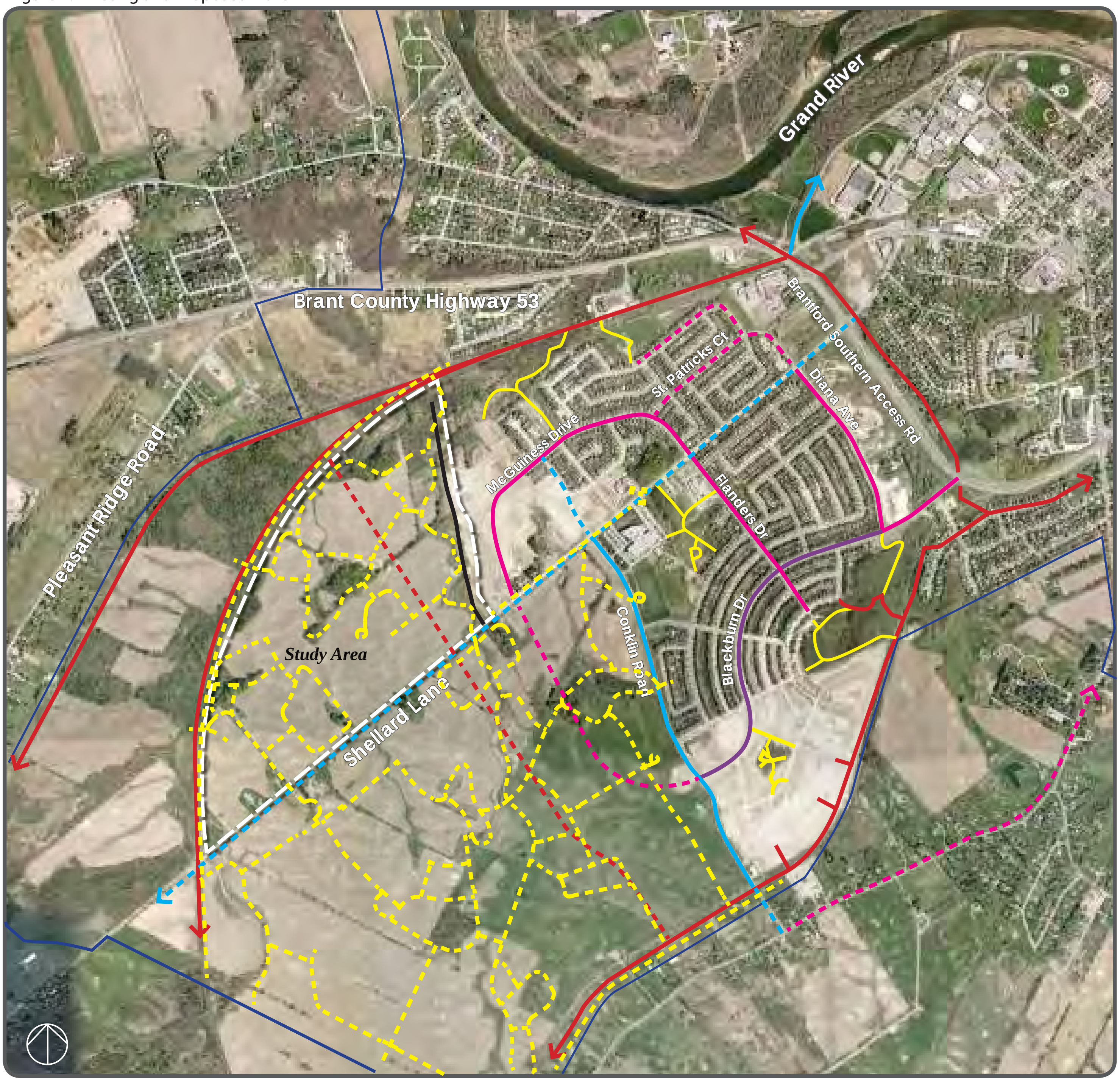
The planned development to the North of Shellard will likely not differ greatly from these values, and thus the planned roadway improvements will accommodate the development.

Land Use	Magnitude	AM Peak Hour			2031 Target Mode Split (%)		
		IN	OUT	TOTAL	IN	OUT	TOTAL
Residential-Low Density	1733 units	219	656	875	629	369	998
Residential-Medium Density	654 units	28	134	162	131	65	196
Employment	270 jobs	196	29	225	29	196	225
Total		443	819	1,262	789	630	1,419

Table 1. Trip Generation Totals

Note: This figure is taken from the February 2008 report entitled *"SW Brantford W. of Conklin SecondaryPlan - Master Servicing & Traffic Report"*

Figure 7. Existing and Proposed Trails



2.3.4 AREA TRAILS

The study area is bordered on the north-west side by the T.H. & B. Rail Trail. This trail provides access to the Trans Canada Trail and the rest of the trails in the city and surrounding county.

Shown on the conceptual West of Concklin Secondary Plan are preliminary trails, which will be subject to the City, and the Grand River Conservation Agency planning and design process and approval prior to construction. Figure 10 shows all of the existing and planned trails in the vicinity of the project site.

LEGEND

- Existing Multi Use Recreational Trail
- Planned Multi Use Trail
- Existing On-Road Bike Lane
- Planned On-Road Bike Lane
- Existing Shared Road/Signed Route
- Planned Shared Road/Signed Route
- Existing Cautionary On-Road Connection (recommended route, not signed, experienced cyclists)
- Existing Park/Foot Path
- Conceptual Trails (Secondary Plan)
- Study Area
- Municipal Boundary

2.4 STAGE 1 ARCHAEOLOGICAL RESOURCE ASSESSMENT

2.4.1 Overview

The North Shellard Neighbourhood and Recreation Plan Stage 1 archaeological assessment, entailed consideration of the pre-development environmental setting of the property, the proximity of previously registered archaeological sites, and a summary review of nineteenth- and twentieth-century mapping. The assessment also included a field review of the subject lands.

The City of Brantford is situated at the interface between the Haldimand Clay Plain physiographic region to the east and the Horseshoe Moraines and Norfolk Sand Plain physiographic regions to the west (Chapman and Putnam 1984). The structures of these landforms, and the specific environmental features they contain, have influenced land use in the City of Brantford throughout history. The greatest influencing factors, however, have been the Grand River, and the large concentration of fertile silt soils in the area. The Grand was highly important in terms of the precontact occupations of the entire area since it constituted both a truly rich biotic environment and the most important transportation route between Lake Erie and the interior of southern Ontario.

In order that an inventory of documented archaeological resources could be compiled for the study area, three sources of information were consulted: the site record forms for registered sites within the Ontario Archaeological Sites Database (OASD) housed at the Ministry of Culture; published and unpublished documentary sources, including the Archaeological Master Plan for the City of Brantford Technical Report (ASI 1997), updated in 2006 (ASI 2006); and the files of Archaeological Services Inc. In Ontario, archaeological sites are registered within the Borden system. The study area under review falls within Borden Block AgHb.

The background research determined that the entire study area was subject to a Stage 1 and 2 archaeological assessment in the spring of 1988 by Archaeological Services Inc. (ASI 1988a, 1988b). This assessment was carried out in anticipation of proposed development within the subject lands by a previous owner. The conditions at the time of the Stage 2 field survey were considered fair to good. The property had been ploughed in the fall of 1987 using a soil saving technique. This process had left considerable corn stubble on the surface of the fields, therefore the visibility for the survey was hindered by the crop debris. The survey was completed by both pedestrian and test pit survey (of wooded areas) at five metre intervals. The Stage 2 survey resulted in 23 archaeological sites being registered within the developable planning area (Table 2) and six registered archaeological sites within the Natural Heritage System (Table 3).

In addition, to the 1988 Stage 1 and 2 archaeological assessment of the subject lands, an avocational archaeologist had also reported a number of discoveries within the North of Shellard Neighbourhood and Recreation Complex study area. These finds consist of a large quantity of artifacts being recovered in the area around AgHb-70. A small cluster of artifacts were similarly documented in the extreme southwest corner of the subject lands where Shellard's Lane and the former rail line meet. Artifacts were also recovered in the northeast quadrant of the subject lands in the same location as AgHb-78 and 79. All of the sites located within the study area are illustrated on Figure 11.

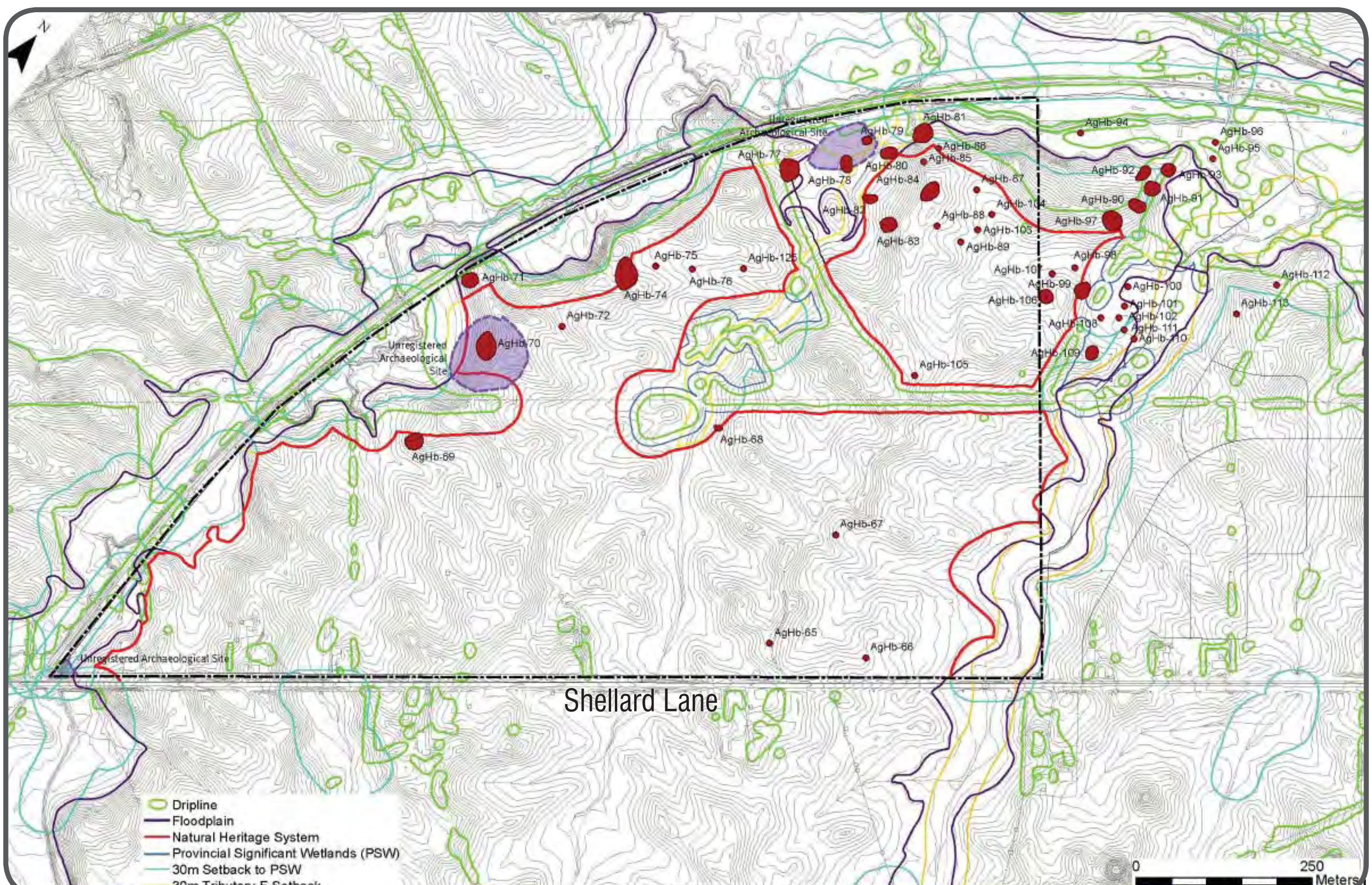
Table 2. Registered Archaeological Sites within the Study Area; inside the Area of Development

Borden	Cultural/Temporal Affiliation	Site Type	Site Size	Researcher
AgHb-65	Early Archaic	Findspot (Bifurcate Base Point)	Isolated find	ASI, 1988
AgHb-66	Historic Euro-Canadian	Findspot (Isolated Gunflint)	Isolated find	ASI, 1988
AgHb-67	Late Archaic	Findspot (Corner-Notched Point)	Isolated find	ASI, 1988
AgHb-68	Undetermined Pre-contact	Lithic Scatter (15-20)	10m x10m, 100m^2	ASI, 1988
AgHb-69	Undetermined Pre-contact	Lithic Scatter (15-20)	20m x20m, 400m^2	ASI, 1988
AgHb-70	Early Woodland	Lithic Scatter (15-20) Early Woodland Drill Base	20m x20m, 400m^2	ASI, 1988
AgHb-72	Undetermined Pre-contact	Lithic Scatter	10m x10m, 100m^2	ASI, 1988
AgHb-74	Undetermined Pre-contact	Lithic Scatter (20-25)	30m x 50m, 1500 m^2	ASI, 1988
AgHb-75	Early Archaic	Findspot (Nettling Point)	Isolated find	ASI, 1988
AgHb-76	Undetermined Pre-contact	Findspot (Isolated Celt)	Isolated find	ASI, 1988
AgHb-82	Undetermined Pre-contact	Lithic Scatter (20-30)	10m x 20m, 200 m^2	ASI, 1988
AgHb-83	Undetermined Pre-contact	Lithic Scatter (20-30)	20m x20m, 400m^2	ASI, 1988
AgHb-84	Undetermined Pre-contact	Lithic Scatter (20-30)	20m x 30m, 600 m^2	ASI, 1988
AgHb-85	Undetermined Pre-contact	Lithic Scatter (5)	5m x5m, 25m^2	ASI, 1988
AgHb-86	Late Archaic	Findspot (Corner-Notched Point)	Isolated find	ASI, 1988
AgHb-87	Undetermined Pre-contact	Lithic Scatter (15-20)	10m x10m, 100m^2	ASI, 1988
AgHb-88	Undetermined Pre-contact	Lithic Scatter (5)	5m x5m, 25m^2	ASI, 1988
AgHb-89	Undetermined Pre-contact	Lithic Scatter	5m x5m, 25m^2	ASI, 1988
AgHb-103	Undetermined Pre-contact	Lithic Scatter (5)	5m x5m, 25m^2	ASI, 1988
AgHb-104	Undetermined Pre-contact	Lithic Scatter (15-20)	10m x10m, 100m^2	ASI, 1988
AgHb-105	Late Archaic	Findspot (Side-Notched Point)	Isolated Find	ASI, 1988
AgHb-106	Undetermined Pre-contact	Lithic Scatter (15-20)	20m x20m, 400m^2	ASI, 1988
AgHb-125	Undetermined Pre-contact	Lithic Scatter (15-20)	15m x 20m, 300 m^2	ASI, 1988

Table 3. Registered Archaeological Sites In the Natural Heritage System

Borden	Cultural/Temporal Affiliation	Site Type	Site Size	Researcher
AgHb-71	Undetermined Pre-contact	Findspot (Crude Biface)	Isolated find	ASI, 1988
AgHb-77	Late Archaic	Lithic Scatter (20-25)	20m x30m, 600m2	ASI, 1988
AgHb-78	Undetermined Pre-contact	Lithic Scatter (15-20)	10m x 20m, 200 m2	ASI, 1988
AgHb-79	Undetermined Pre-contact	Lithic Scatter (15-20)	10m x10m, 100m2	ASI, 1988
AgHb-80	Undetermined Pre-contact	Lithic Scatter (15-20)	20m x 30m, 600 m2	ASI, 1988
AgHb-81	Undetermined Pre-contact	Lithic Scatter (15-20)	20m x 30m, 600 m2	ASI, 1988

Figure 8. Location of Registered and Unregistered Archaeological Sites within the North Shellard Neighbourhood and Recreation Plan



Brantford was completed and a precontact archaeological potential model was developed which remains applicable for the planning study area (ASI 1997). This model was developed using a GIS to map various sets of information as separate, but complementary layers of spatial data on 1:10,000 scale digital base maps.

First, various criteria were mapped and evaluated in order to develop the archaeological potential zone. These included: soils classified by drainage, texture, and capability for agriculture; hydrography, focusing on the Grand River. The archaeological potential zone was then refined by eliminating areas where previous land development had severely disturbed the landscape. Created as a discrete layer of archaeological land integrity, this map was based on the identification of totally disturbed areas using existing land use mapping and visual review of these areas. Basically, the modelling exercise determined that over 85% of all registered and unregistered precontact sites and isolated finds in the City of Brantford may be expected to occur within 150 metres of water, including relict sources. This finding suggested that a buffer zone extending 150 metres from any water source constitutes an acceptable characterization of precontact archaeological site potential (ASI 2006a). The results of previous archaeological surveys within the study area (ASI 1988b) are consistent with this characterization.

In the past decade there has been further insight into the location of archaeological sites on the floodplain of the Grand River and associated cold water streams. D'Aubigny Creek is a cold water creek located along the northeast limits of the study area. Closer to the mouth where the creek enters the Grand River the D'Aubigny Creek site (AgHb-276) was discovered in 2005, during a Stage 2 archaeological assessment of a proposed trunk watermain extending through D'Aubigny Park. Artifacts were found during the test pit survey extending over an area over an area of 15 metres by 25 metres. Further Stage 3 test excavations involved the removal of overburden by Gradall and the excavation of one metre test units. These test units contained buried paleosol and artifacts from four distinct strata. The Stage 4 mitigation continued through block excavation of each of the identified strata, and determined that Strata (5 and 6) were the primary occupation layers. These layers were dated to the Middle Woodland period through AMS 14C dating performed on the botanical remains found in the context of Strata 6. Several other layers, however, revealed diagnostic artifacts dating to the Archaic period. In total, over 1,800 artifacts were recovered indicating a continuous human occupation of the site over a 4, 500 year period (ASI 2006c). The North of Shellard Neighbourhood and Recreation Plan is situated in a similar environment to where buried paleosols have been identified and there is similar potential for early sites to occur in buried deposits.

Early historic map sources to depict rural farmsteads, were also reviewed to determine the potential for the presence of historical farmsteads or other historical features within the study area (Figures 2-4). For the purposes of this study, the 1839 Plan of the Township of Brantford, the 1858 Tremaine Map of Brant County and the 1875 Illustrated Historical Atlas of Brant County, were reviewed. The 1875 Historical Atlas map is the only map to include rural farmstead locations. No structures were depicted within the study area on the 1875 map.

Overall, given the subject lands proximity to water, the location of Shellard's Land, the proximity of the Brantford & Norwich & Port Burwell Rail Road (B&N&P.B.R.R.) and the general nineteenth century development in the area, however, there is potential for the identification of historical Euro-Canadian archaeological remains within the study area. It should also be noted that not all features of interest were mapped systematically in the Ontario series of historical

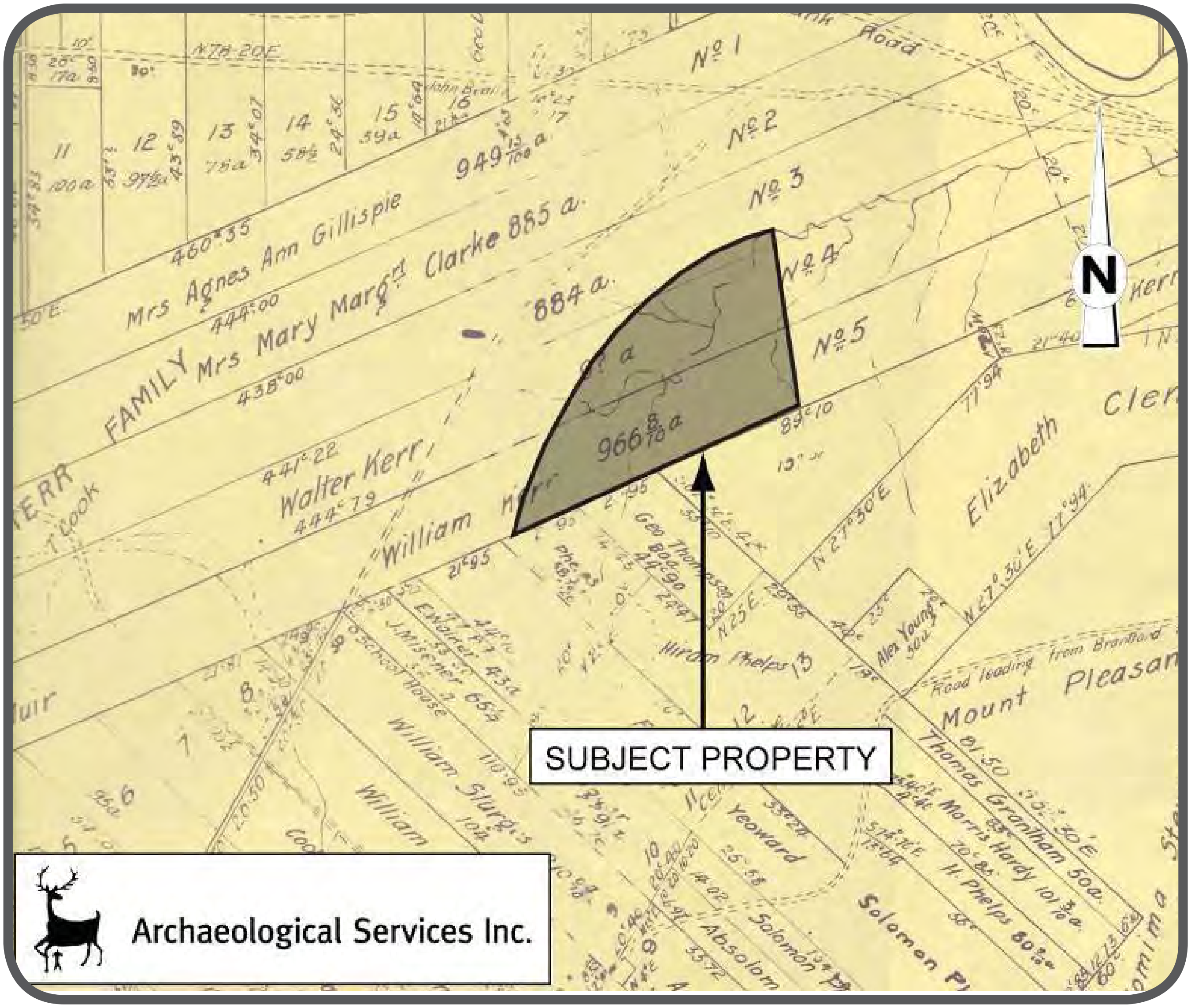


Figure 9. The study area overlaid on the 1839 *Plan of the Township of Brantford*. Note that the boundaries of this study area relative to the nineteenth century map are approximate.

atlases, given that they were financed by subscription, and subscribers were given preference with regard to the level of detail provided on the maps.

Moreover, not every feature of interest would have been within the scope of the 1875 *Atlas*.

The assessment included a Stage 1 field review of the property to review the current land conditions. The field review found that there have been no significant changes to the landscape since the 1988 survey. The fields located in the east portion of the property had been planted in corn and had been recently harvested while the fields in the west had been planted in soya bean that had also been recently harvested (Plates 1-2). The extreme southwestern portion consists of a residence with an adjacent vacant grassed field. There are also wooded areas in the north and hedgerows separating some of the farm fields.

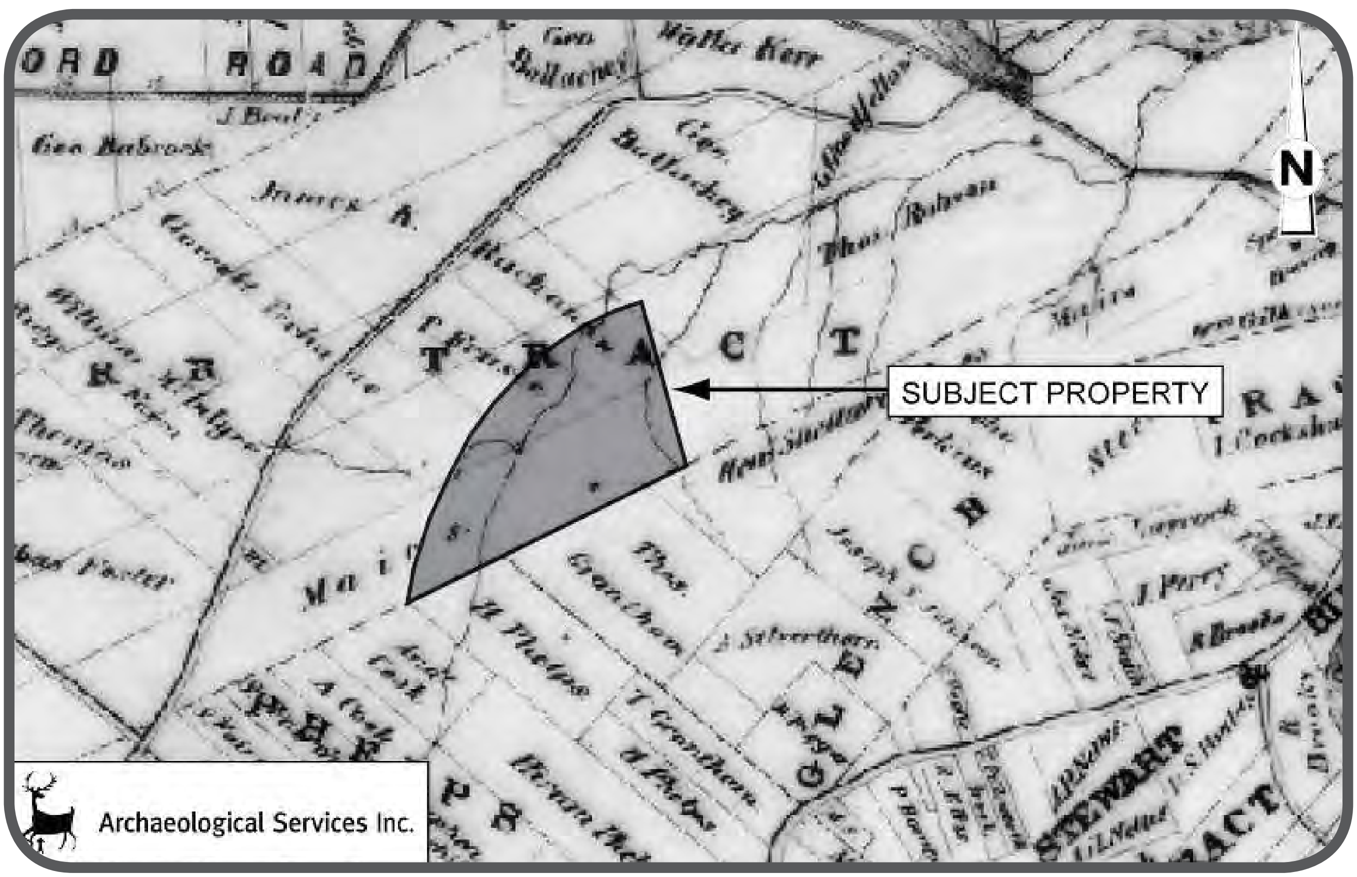


Figure 10. The study area overlaid on the 1858 *Tremaine Map of Brant County*. Note that the boundaries of this study area relative to the nineteenth century map are approximate.

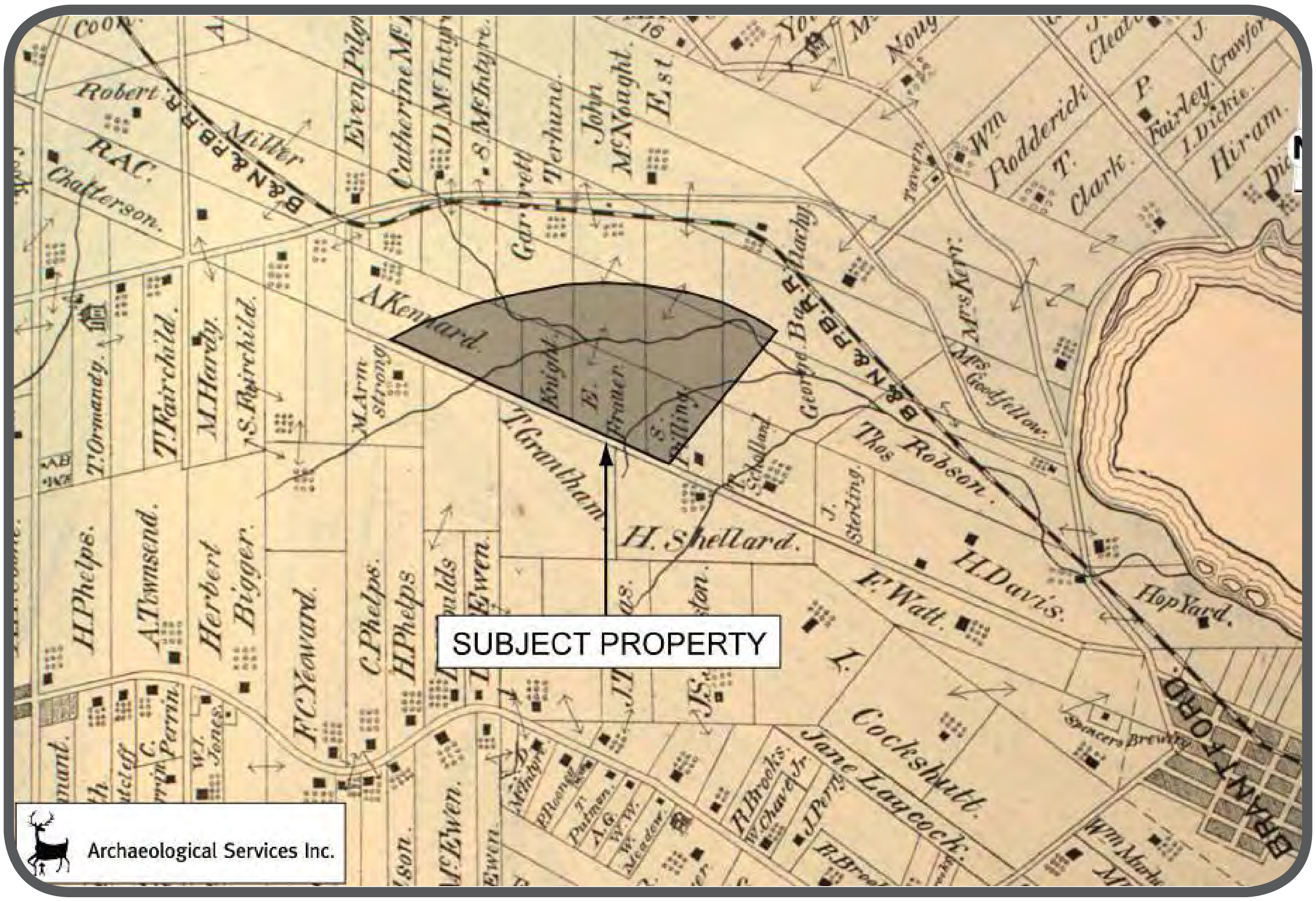


Figure 11. The study area overlaid on the map of Brantford Township (west of the Grand River) in the 1875 *Illustrated Historical Atlas of Brant County*. Note that the boundaries of this study area relative to the nineteenth century map are approximate.

There have been no significant changes to the landscape since the time of the 1988 Stage 2 survey. As previously indicated at the time of the 1988 survey the preparation of the subject lands was completed by means of a soil saving technique. The visibility of the survey in 1988 was therefore hindered due to crop residue on the surface of the fields. These survey conditions are no longer acceptable for archaeological survey and therefore the Stage 2 survey of the study area must be redone in accordance with the current Ministry of Tourism and Culture's Standards and Guidelines for Consulting Archaeologist.

Recommendation

A Stage 2 archaeological assessment is recommended for the North Shellard Neighbourhood and Recreation Plan prior to any land-disturbing activities, in accordance with the current Ministry of Tourism and Culture Standard's and Guidelines for Consultant Archaeologists (2010).

Figure 12. Looking northwest across recently harvested corn field.

Figure 13. Looking east to the existing housing north of Shellard's Lane.

2.5 Servicing

The following is a summary of the wastewater, potable water, and stormwater facilities currently existing in the vicinity of the North of Shellard Lane Neighbourhood, within the West of Conklin Road Secondary Plan area.

2.5.1 WASTEWATER SERVICING

The City of Brantford current design criteria for sanitary sewer systems is based on MOE Guidelines. Design flow rates for new sewer systems are estimated using the following formula:

$$Qd = mPq + IA$$

where:
Qd = projected design flow
m = Peaking Factor, calculated using Harmon's Formula
P = design population
Q = Average daily domestic generation rate (450 L/cap/day)
I = infiltration allowance (0.20 L/s/ha)
A = tributary area to the sewer reach.

All new sewers within the North of Shellard Neighbourhood will be designed to the current City Standards.

There are currently two wastewater mains available in proximity to the North of Shellard Neighbourhood. The two potential outlets for wastewater generated from this future development area are described below.

Shellard Lane Trunk Sewer

The City of Brantford previously extended the Shellard Lane Trunk Sanitary Sewer westerly from Conklin Road to McGuiness Drive, where the sewer currently terminates at MH ED130. The existing sewer is a 675 mm diameter sewer installed at a gradient of 0.30%. This sewer has a nominal design full-flow capacity of 460 L/s, which could accommodate a projected population of 27,500 persons, assuming a population density of 55 ppha.

The existing sewer was installed at an invert elevation of 210.64 at MH ED130, or approximately 7.0 m below finished road elevation on Shellard Lane.

McGuiness Drive Sub-Trunk Sewer

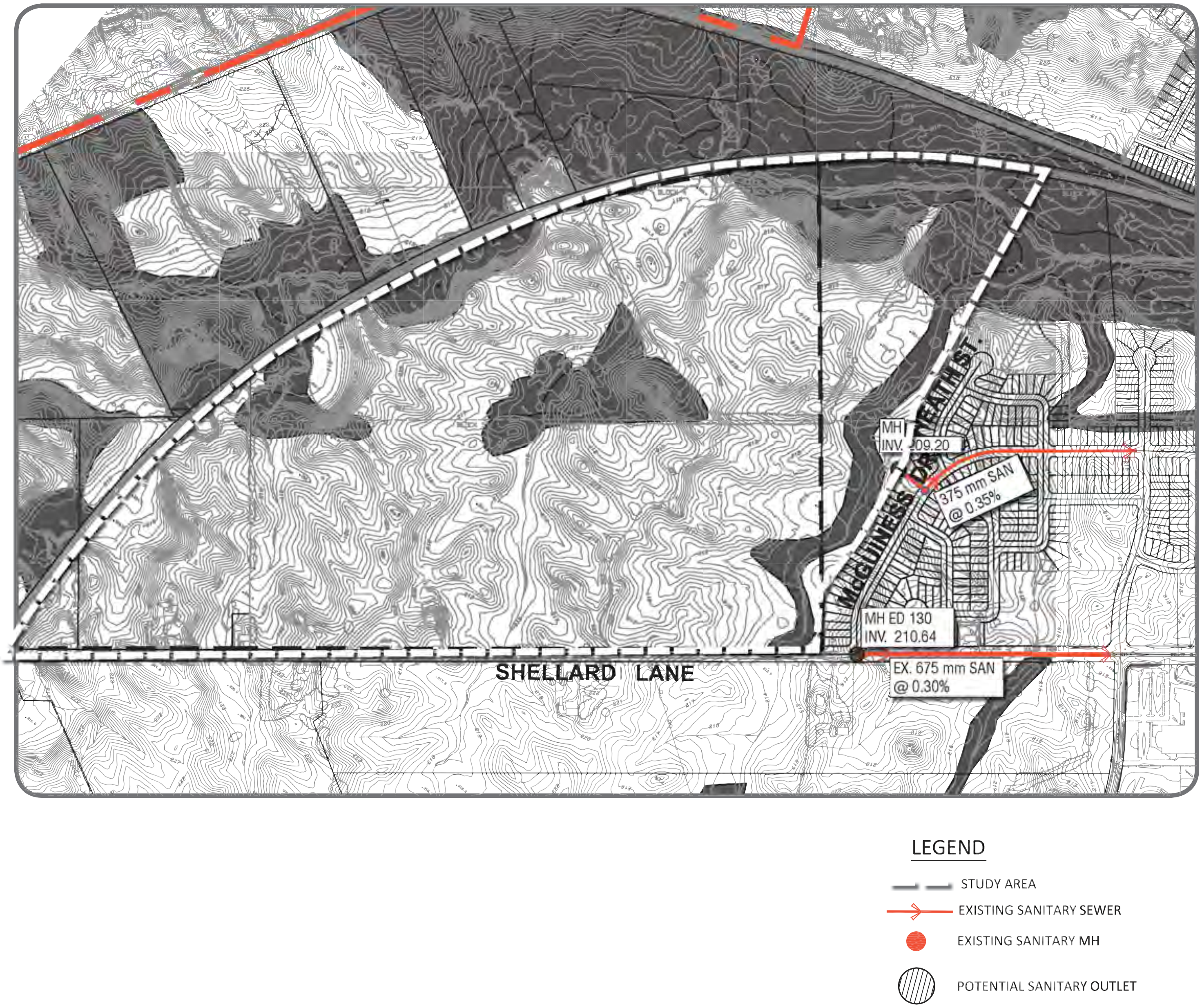
The City of Brantford previously extended the McGuiness Drive Sub-Trunk Sanitary Sewer westerly along McGuiness Drive, where the sewer currently terminates at a manhole structure located within an access block approximately 60 m northwest of McGuiness Drive. The Sub-Trunk sewer was originally designed and constructed at a flatter gradient through this subdivision in order to maximize the potential gravity service area.

The existing sewer is a 375 mm diameter sewer installed at a gradient of 0.35%. This sewer has a nominal design full-flow capacity of approximately 104 L/s, which could accommodate a projected population of 5,050 persons, assuming a population density of 55 ppha.

The existing sewer was installed at an invert elevation of 209.20 at the terminal MH, or approximately 1.4 m below the Shellard Lane Trunk Sewer.

The locations of the two potential sanitary sewer outlets are shown on the map on the facing page.

Figure 14. Existing Wastewater Collection System



2.5.2 POTABLE WATER SERVICING

The City of Brantford current design criteria for water distribution systems is based on MOE Guidelines. The relevant design parameters for water distribution systems are summarized below:

Domestic Demand:	450 L/cap/day
Maximum Day Factor:	2.0
Peak Hour Factor:	3.0
Minimum Fire Flow:	Fire Underwriter's Survey recommendations
System Pressure:	target between 50 psi and 80 psi; system pressure shall not fall below 40 psi under Peak Hour Demands; system pressure shall not fall below 20 psi under Maximum Day plus Fire condition

The study area lies within Brantford Pressure Zone 1. Staff from the City of Brantford have confirmed that Zone 1 system pressures will provide suitable distribution system pressures throughout the North of Shellard Neighbourhood, subject to an evaluation of the distribution network.

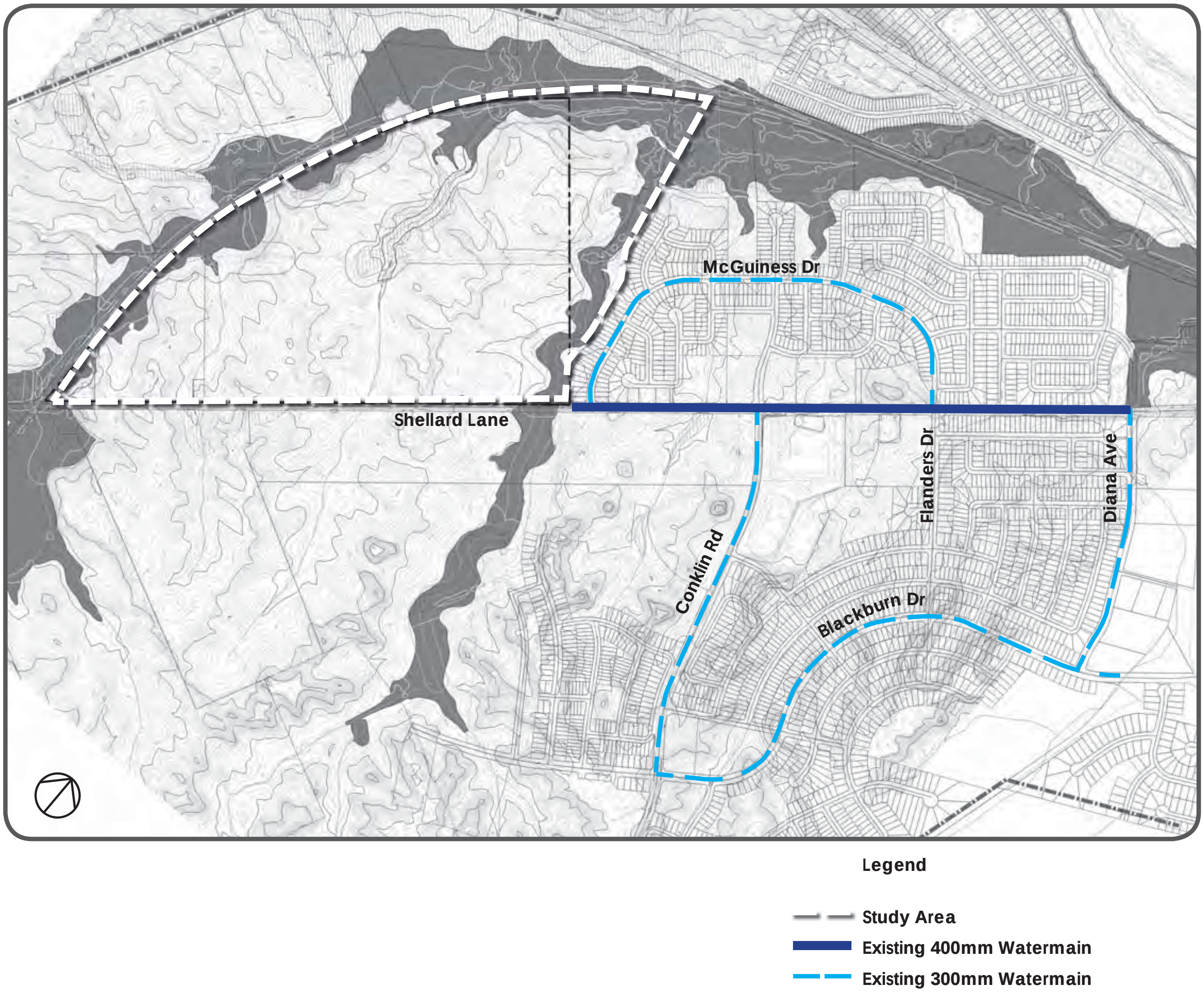
According to Water Operations Staff from the City of Brantford, there is adequate storage within the existing distribution system to accommodate growth within the subject area; however, there are some distribution system limitations within Zone 1. The City intends to initiate a Class EA Study in early 2011 to confirm the preferred method to alleviate system pressure limitations, and to provide additional storage for future growth within Zone 1. Water supply and storage should not be a constraint to development within the North of Shellard Neighbourhood.

The City of Brantford has constructed a 400 mm diameter trunk watermain on Shellard Lane from Conklin Road to the intersection of McGuiness Drive. In addition, the City has provided a 300 mm diameter trunk watermain loop on McGuiness Drive. The City has also provided a 300 mm trunk watermain loop on Conklin Road and Blackburn Drive to the 400 mm trunk watermain on Diana Avenue. The 300 mm trunk watermains are planned to be extended through Neighbourhoods 1 and 3 to Shellard Lane.

There is also an existing 200 mm local watermain on Shellard Lane. The City intends to abandon this local watermain on Shellard Lane when the 400 mm trunk watermain is extended westerly.

The location of the existing water distribution system in the vicinity of the subject lands is shown on the map on the facing page.

Figure 15. Existing Trunk Water Distribution Network



2.5.3 STORM DRAINAGE FACILITIES

The North of Shellard Neighbourhood lies within the D'Aubigny Creek Watershed. All drainage from the site is directed to D'Aubigny Creek either directly, or via one of three tributaries. Drainage from Neighbourhood 3 (lands south of Shellard Lane) is also conveyed through the subject lands.

The D'Aubigny Creek watershed was studied by the City in the early 1990's, which culminated in the preparation of the D'Aubigny Creek Subwatershed Master Plan Study Phase 2 (Philips Planning & Engineering Ltd., April 1995). This document outlined the overall objectives for management of storm runoff from new development within the watershed.
Subsequently, the City undertook the West of Conklin Secondary Plan. As part of the Secondary Planning process, the City prepared the Master Servicing and Traffic Report -Southwest Brantford West of Conklin Secondary Plan (URS, October 2007). This document defined the overall management objectives, and defined an overall strategy for managing surface water runoff from the Secondary Plan area.

The North of Shellard Neighbourhood comprises Zone C of the Secondary Plan. Tributaries H, G, and F drain south to north through the site, and Tributary E generally defines the eastern limit of the neighbourhood.

2.5.4 STORMWATER MANAGEMENT CRITERIA

The relevant Stormwater Management Criteria included within the Strategy adopted under the Secondary Plan study are summarized below:

Water Quality

An Enhanced level of water quality treatment is required as defined in the MOE design manual. Management measures are also required to address thermal impacts from the development, to protect the coldwater stream.

Water Quantity

Post development runoff to be controlled to pre-development rates, up to and including the 100-year storm event.

Erosion Control

Provide extended detention for a 25 mm storm event, and release the runoff over a period of 48 hours. Downstream channel stability to be evaluated to ensure that the extended detention outlet rate does not negatively impact the most sensitive reach downstream.

Water Balance

A comprehensive water budget analysis for D'Aubigny Creek and its tributaries is required to characterize existing hydrologic conditions and to assess development impacts on key functions such as groundwater recharge and stream baseflow.

Flood Encroachment Limit

No development is permitted within the regulatory floodplain of D'Aubigny Creek or Tributary E. The greater of the 100-year storm or Hurricane Hazel is the regulatory storm.

Slope Stability and Erosion Analysis

GRCA requires development setbacks that protect future development from erosion and slope stability issues. This would be a potential issue along watercourses where slopes are greater than 15%. Setback requirements will be submitted in support of the proposed Draft Plans.

Stormwater Management Plan

The preferred stormwater management plan features three stormwater wet ponds identified as Pond C1, Pond C2, and Pond B6D in the Secondary Plan discharging into D'Aubigny Creek. These ponds will provide water quality, quantity, and erosion control for the site. Ponds C1 and B6D will service the North of Shellard Lands only while Pond C2 accepts drainage from the Neighborhood 3 lands located south of Shellard Lane. Flows from Neighborhood 3 would either be conveyed through a 100-yr storm sewer into Pond C2 or lot level controls would be provided to control flows to the minor system capacity.

2.6 Summary

Key opportunities and constraints to the future development of the North of Shellard Lane Neighbourhood Study Area were identified through this background analyses.

Based on the findings, the consulting team prepared several design options over the course of a three-day workshop. The Design Options are presented in *Part 3 Design Workshop* of this report, and demonstrate different design ideas in terms of the road pattern, mix of uses, type of built form, and range of open space opportunities for future development within the North of Shellard Study Area. Key design elements were drawn from each option, and further refined in the preparation of a Preferred Plan (*Part 4 The Preferred Plan*).

A review of the design givens, site topography, policy directives and design principles from the West of Conklin Secondary Plan provided a framework from which the North of Shellard Study Area can be planned and developed. While this framework establishes a land use and collector road structure from which the plan will build on, further refinement of the plan at the local street and block scale is required.

The existing environmental analysis determined the limit of urban development and the appropriate setback buffers to its diverse elements.

The Stage 1 archaeological resource assessment entailed consideration of the proximity of previously registered archaeological sites, the pre-development environmental setting of the property and a summary review of nineteenth- and twentieth-century mapping. This research has identified 23 registered archaeological sites within the proposed developable area and six registered archaeological sites within the Natural Heritage System. These sites were registered as a result of a Stage 1 and 2 archaeological assessment previously completed by Archaeological Services Inc. in 1988. The review of the historical mapping did not identify any historical homesteads within the study area, however, the area is in proximity to D'Aubigny Creek and the Brantford & Norwich & Port Burwell Railroad (B&N&P.B.R.R.) The study area is also adjacent to Shellard's Lane, a historical transportation route.

The assessment included a Stage 1 field review of the property to review the current land conditions. The field review found that there have been no significant changes to the landscape since the 1988 survey.

A Stage 2 archaeological assessment is recommended for the study area prior to any land-disturbing activities, as the previous survey was not completed in accordance with the current Ministry of Tourism and Culture Standard's and Guidelines for Consulting Archaeologist (2010).

The road system is being upgraded to accommodate substantial future growth in this part of the City of Brantford.

Servicing options for the remainder of the West of Conklin are also under consideration. Full urban servicing can be made available to the new development within the Study Area in a timely and cost-effective manner.

Design givens that resulted from this study's background analysis framed the development of the design options for the workshops. They were:

1. The vision for the site will be predicated on the creation of two distinctive character areas, including:
   - the Village Centre; and,
   - the Institutional Node;
2. Recommended setback buffers to Natural Heritage features are:
   - 30m to core areas; and,
   - 15m to identified woodlots and hedgerows;
3. The institutional node will accommodate for:
   - a high school
   - a library
   - a recreation centre
   - a place of worship;
4. The Village Centre area is to include small scale retail, mixed use retail residential and medium and high density uses;
5. The Open Space system should provide for a hierarchy of passive and active open space facilities for both the local neighbourhood and the recreation complex;
6. Three storm water management facilities are recommended and their areas are to be incorporated into the proposed open space system;
7. A 36.0 metre right of way for Shellard Lane is assumed as per West of Conklin Secondary Plan Urban Design Guidelines;
8. No land uses will back onto Shellard Lane;
9. Internal collector road alignment and intersection spacing onto Shellard Lane will be maintained, as per Secondary Plan recommendations;
10. Individual vehicular access to residential and mixed-use buildings located along the collector road is not permitted;
11. A trail system will link all open space areas including the recreation centre to the existing surrounding trail system;
12. The interface between the built environment and natural heritage areas will be handled through a balance of single-loaded roads and back-lotting.
13. Additional community scale sustainable design initiatives will be explored such as:
    - bio swales;
    - passive solar orientation of streets; and,
    - constructed wetlands.

Part 3
DESIGN WORKSHOP

3.1 Preliminary Work

Local neighbourhood and sport groups/organizations were invited to participate in half-an-hour evening interview sessions at City Hall. The main goal of these interviews was to compile a wish list of indoor/outdoor facilities and sportsfields and access space requirements prior to the three-day workshop working sessions. Input was provided through a series of face-to-face and emailed interviews, and were conducted on September 20th, 21st, and 23rd.

Table 4. Summary of findings from local neighbourhood and sport groups/organizations interviews

	Local Neighbourhood & Sports Groups/Organization	Outdoor Facility Requirements	Indoor Facility Requirements	Accessory Space Requirements
Sept 20, 2010	[8:00pm] Brad Ward **Brantford & District Football Club & Brantford City Soccer Club**	3 Artificial turf football fields (1 with viewing for 1,000 spectators; 1 with viewing for 500 spectators; and, 1 with natural grass soccer field)	1 Multi-purpose field with dome (football, rugby, soccer, baseball, etc.)	
Sept 21, 2010	[3:30pm] Andrew Pilkington **Brantford Galaxy Soccer & Brantford Intercity Soccer Club**	2 Multi-purpose fields with media booths	1 Weight space	Storage
		4 Soccer fields (with 2 artificial turf, lighting, and viewing for 2,000-3,000 spectators)	1 Futsol court	Office space
	[4:30pm] Edith Hayman **Brantford Junior Badminton Club**		8 Badminton courts (1 with viewing area)	Meeting space Classroom space
	[5:15pm] Bill Harding **Brantford Sports Council**		Skating rink	Change rooms Pro-shop
	[6:00pm] Barb Walsworth, Jason Virtue & Bill Harding **Shellard Neighbourhood Association**	Flag football	Gymnastics/weights	Snack bar
		Outdoor ice rink	Fitness space (aerobics, yoga, spinning, etc.)	Coffee pub
		Ball diamonds	Double gym with storage	Daycare
		Multi-level playground for all ages		Youth - St. Leonard
		Splash pad		Arts (dance, music)
		Skateboard park		Social services
	[6:30pm] Wade Parsons **Brantford Minor Lacrosse**		1 Court	Police satellite Curling club
Sept 23, 2010	[3:30pm] Paul Wilson **Special Olympics**	2 Bocce pits	16 Lanes for indoor bowling	Sports medicine clinic Kitchen
	[4:00pm] Jason & Tracy Oldroyd **Brantford Minor Softball**	8 Baseball diamonds		Restaurant Restaurant
	[5:00pm] Bethany Timmerman **Brantford Track & Field**		200m Running track with 4 lanes	Public washrooms Library
	[5:30pm] Kevin Allen **Brantford Boy's Youth Flag Football**	Okay with sharing football field		
	[6:00pm] Rebecca Offenhammer **Brantford Co-ed Adult Volleyball League**	Beach volleyball court (number not specified)	Need volleyball courts (number not specified)	
	[6:30pm] Cheryl Antoski **Volleyball – Branlyn Neighbourhood**		Need volleyball courts (number not specified)	
	Briers Basketball [email Sept 21, 2010]		Double gym	
	Tennis & Raquet Club [tbd]	TBD	TBD	
	Squash Club [tbd]	TBD	TBD	

3.2 Workshops

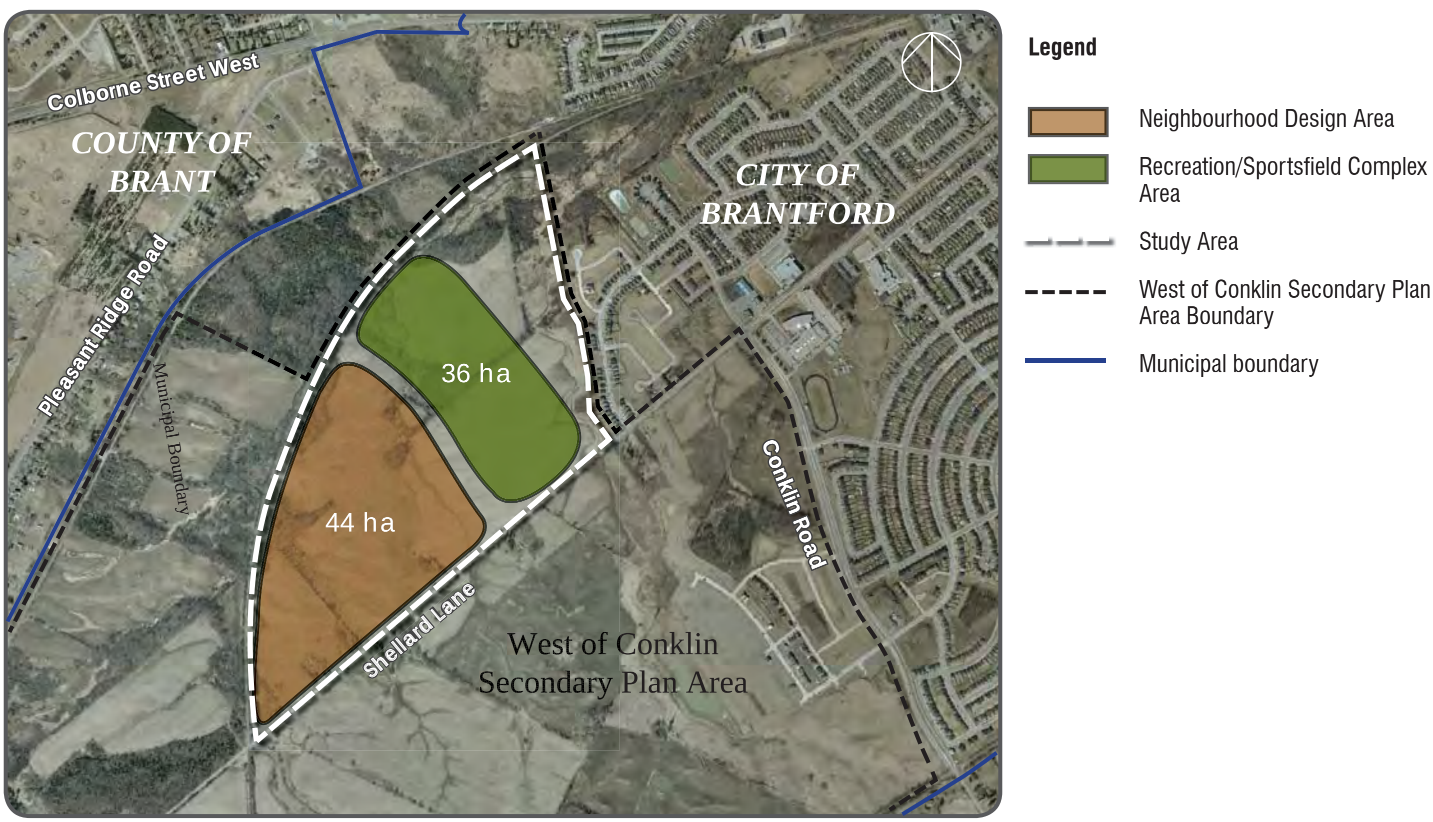
Between October 5th and October 7th, staff members from the City of Brantford and the consulting team assembled at T.B. Costain/SC Johnson Community Centre to conduct a workshop on the North of Shellard Neighbourhood and Recreation Plan.

The purpose of the three-day workshop was to develop the framework of ideas that would shape the overall neighbourhood plan for the community and site plan for the Recreation Centre.

The intent was to fully explore options with respect to development, heritage, the environment, and transportation through consultation with City staff, local neighbourhood organizations and sports groups, landowners and business operators, developers, representatives of special areas of interest, nearby residents and the general public.

The workshop was held in a forum where the consulting team developed the framework of ideas while working with the community in consultation with all those who were interested in participating. The workshop was a combination of focused working sessions for the team and targeted meetings with specific groups. The public was invited to review the team's work in progress in the evenings of October 6th and 7th.

Figure 16. General allocation for Neighbourhood and Recreation/Sportsfield Complex Areas



3.3 Workshop Day 1

October 5th, 2010

The first of three Design Working Sessions convened on the evening of October 5th, 2010 with Sports/Recreation Groups. The session consisted of a presentation given by the consultant team. The intention was to introduce workshop participants to preliminary background information about the study area, review the design principles, introduce other built recreation/sports complex precedents, and provide a summary of input given by various sports groups as previously mentioned.

The need for a rugby field was identified at the end of this session as the City currently lacks a facility of this nature.

3.4 Workshop Day 2

October 6th, 2010

The focus of the second day was to discuss the overall community design of the Study Area. The morning was set aside for the consulting team to begin draft design concepts based on the identified opportunities and constraints. The morning session was followed by a presentation to City staff in the afternoon, wherein further input was gathered and questions raised with regards to: affordable housing, density, public works, economic trade-offs, and community safety and policing.

In the afternoon, a workshop open to all participants was held as the concepts were further developed. Some questions and comments raised at this workshop included:

- Concern for the number of people entering and/or exiting the neighbourhood during major events (for example, within the recreation/sportsfields complex);
- Master transportation plan needs to address the impacts of the Highway 403 extension;
- Need for geared-to-income seniors housing;
- Greater diversity of housing required;
- Need to address lifestyle living - accessibility issues and universal design, especially for seniors and the disabled.
- Multi-use trail and bike issues - desire by students to bike to school (i.e. functional trips);
- Space requirements for physiotherapy in community centre;
- School site locations - concern for increased travel along Shellard Lane;
- Proximity of commercial/mixed-uses to schools is a concern - opportunities for students to buy fast-food (i.e. increase childhood obesity);

The day ended with an evening workshop with the public. The design options were pinned up and reviewed by the participants. Still a work in progress, a Preferred Plan for the Residential Neighbourhood was prepared which took into account the day's input and results of the workshop to date.

3.4.1 Neighbourhood Design Options

Over the course of day 2, two design alternatives were developed for the neighbourhood design within the Study Area.

At the outset of the design process, a number of critical elements and features were fixed to ensure their inclusion into each of the design options and to provide a level of commonality between the concepts for evaluative purposes.

The common features between each of the design concepts include:

- environmental features;
- stormwater management facilities;
- utility/service corridors;
- function of the village centre; and,
- approximate areas allocated for the neighbourhood and the recreation/sportsfield complex.

These key factors served to focus discussion throughout the design process and informed the evolution of both the neighbourhood and recreation centre design schemes, in addition to the ultimate arrival at the Preferred Plan.

Figure 17. Neighbourhood Design Option 1

Neighbourhood Design Option 1

Key design elements include:

1. Provision for an expanded boulevard with a bioswale in order to improve water quality and enhance ground water infiltration.

2. Align streets and blocks to maximize passive solar energy production and achieve sustainable goals of energy conservation.

3. High school is centrally located within the neighbourhood, and highly accessible along the major collector road and bus route to support active transportation.

4. Smaller parkettes act as a focal point for the residential neighbourhoods.

5. 'Main street' character of mixed-uses, small-scale shops and residential units above line the collector road, and acts as a gateway into the community with larger commercial stores at Shellard Lane.

6. Stormwater management ponds are located at the terminus of road vistas, and is a key part of the trails network, linked to the natural heritage system.

7. Lane-based medium density units front onto the collector roads, while lower densities are located in internal pods.

Neighbourhood Design Option 2

Key design elements include:

1. The school site is located closer to the recreation centre / sportsfield complex, minimizing the amount of cars/students filtering into the residential neighbourhood areas and concentrating all institutional uses in one area.

2. East-west street pattern is maintained throughout the residential neighbourhoods.

3. Preservation of the existing north-south hedgerow.

4. Maximize views and vistas into the natural heritage system to ensure a connected open space and trail system.

5. Higher residential densities are located along the collector road, and live-work units line the road leading into the Village Centre.

6. Landscaped round-about located centrally at the intersection of the collector roads to function as a traffic calming and design feature.

Figure 18. Neighbourhood Design Option 2

3.5 Workshop Day 3

October 7th, 2010

The focus of the third day was to discuss the Recreation Centre. The morning was set aside to meet with City staff and provide a brief overview of key observations and input received to date. The discussions that took place included the number and type of sports facilities and fields to be accommodated for within the study area. The importance of delivering a sports program that includes all ages was integral to this exercise.

In the afternoon, a workshop to design the Recreation Centre was open to all participants. Three options were developed by the consultant team, aided by the input provided by the participants. At the end of the session, the concepts were pinned up and reviewed by all participants. The workshop concluded with an evening session with the public.

Some questions and comments raised at this workshop included:

- Clarification on the size of the proposed Library facility; and,
- Clarification on the next steps of this process and future development timeline.

Still a work in progress, a Preferred Plan for the Recreation Centre was prepared which took into account the input and results of the workshop. Three design alternatives were developed for the recreation/sportsfield complex.

Recreation/Sportsfield Complex Option 1

Key design elements include:

1. Provision of 4 full sized fields (110 x 55 metres), two ball fields (95 metres at centre field), and a practice field.

2. Fields south of hedgerow oriented parallel with site's property lines to maximize efficiency (number of fields).

3. Mix of fields in south portion of site (fields and diamonds).

4. North portion of site dedicated to fields (Soccer, Football and Rugby).

5. Parking divided between three proposed lots.

6. Community parkette / playground.

Figure 19. Recreation/Sportsfield Complex Option 1

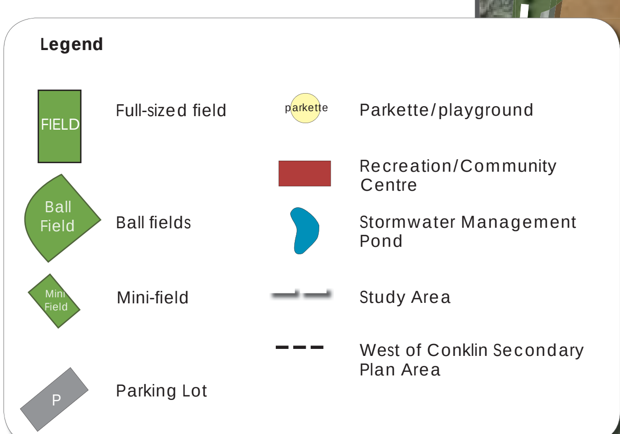


Figure 20. Neighbourhood Design Option 1

Recreation/Sportsfield Complex Option 2

Key design elements include:

1. Provision of 2 full sized fields (110 x 55 metres), three ball fields (95 metres at centre field), and two practice fields.
2. Fields south of hedgerow oriented for optimum solar orientation.
3. Fields orientation works with existing topography.
4. Mix of fields in both north and south portion of site (both fields and Diamonds).
5. Parking divided between three proposed lots.
6. Community parkette / playground.

Legend

Recreation/Sportsfield Complex Option 3

Key design elements include:

1. Provision of 2 full sized fields (110 x 55 metres), two ball fields (95 metres at centre field), and two practice fields.

2. Fields oriented parallel with site's property lines to maximize efficiency (number of fields).

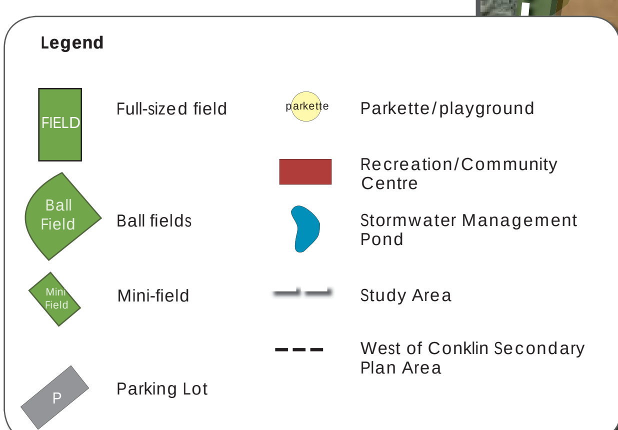
3. Field at Shellard Lane ideal as a stadium or covered dome due to proximity to proposed community centre.

4. Mix of field and diamonds in north portion of site with south portion dedicated to play fields.

5. Parking divided between three proposed lots.

6. Community parkette / playground.

Figure 21. Neighbourhood Design Option 2



Part 4
THE PREFERRED PLAN

4.1 The Preferred Plan

4.1.1 THE VISION

The demonstration plan (shown on the following page) and supporting diagrams contained within this chapter build upon the West of Conklin Secondary Plan policies and regulations to further illustrate the potential development form for the North of Shellard Lane Study Area.

As stated in the Secondary Plan, the vision for this study is to deliver a: *"…community that is diverse in use and population, is scaled to the pedestrian, can accommodate private automobiles and transit and has a well defined and high quality public realm."*

Key components of the initial vision reflected in the Plan are:

1. the implementation of a vibrant neighbourhood with a clear centre and edges;
2. the delineation of a Main Street area as the core feature of the Village Centre and surrounding neighbourhoods;
3. the implementation of the Secondary's Plan proposed major and minor collector road system;
4. the completion of a regular street and block pattern;
5. the conservation of the surrounding Greenland System and appropriate buffers;
6. the delivery of a complete active and passive open space program at the neighbourhood scale; and,
7. the further enhancement and extension of the existing trail system.

After a city wide assessment of recreational and sports facilities, a large recreation component was added to the initial Secondary Plan vision with the clear directive of ensuring the delivery of a vibrant, diverse and pedestrian scaled community while procuring a city wide recreation and sports amenity facility in response to the identified City needs.

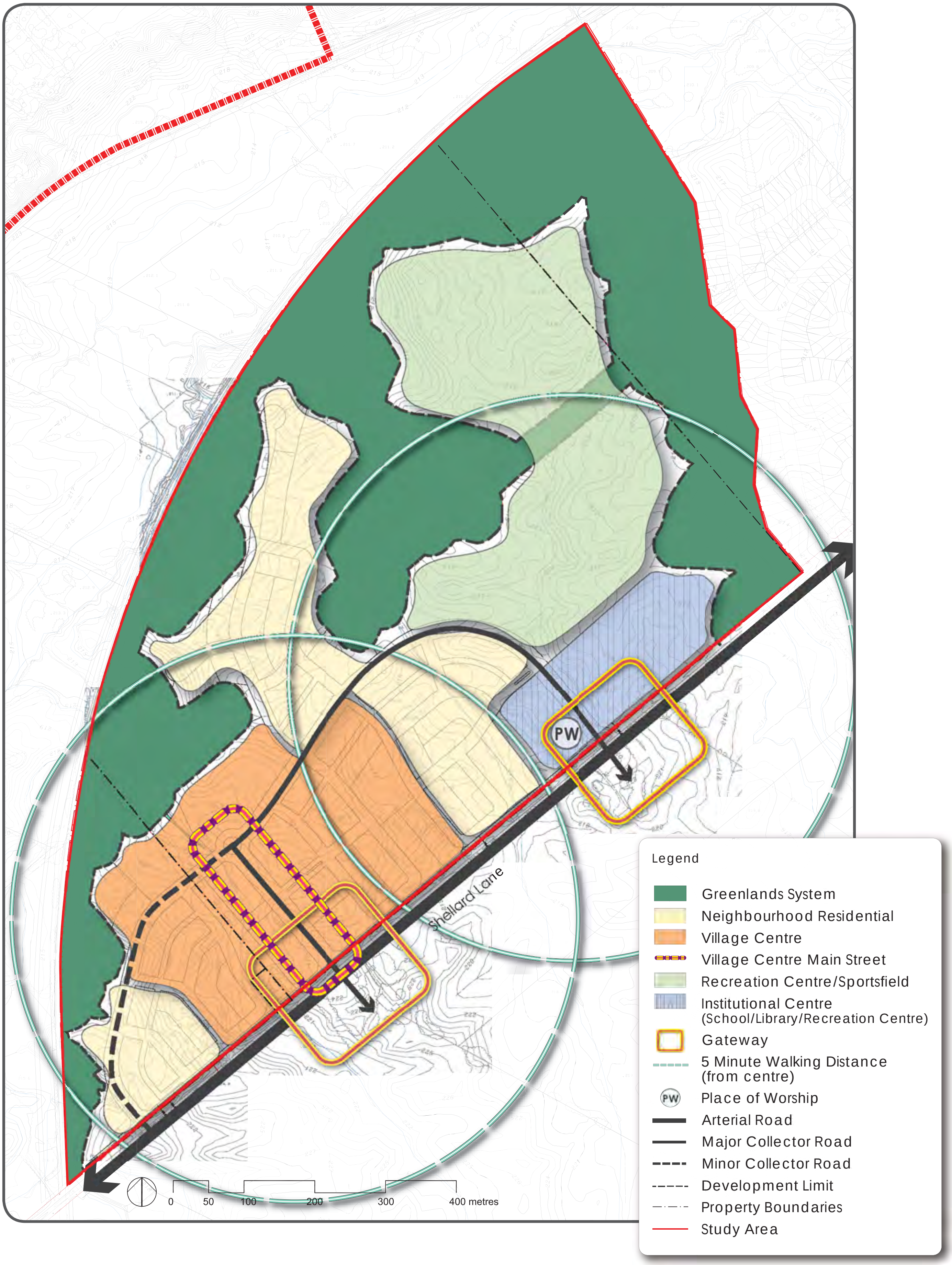
The following seven components of the Neighbourhood Plan further describe how the North of Shellard Neighbourhood and the Recreation/Sports Centre are intended to be delivered:

1. Neighbourhood Structure Plan;
2. Land Use Structure Plan;
3. Open Space Structure Plan/ Trails Network Plan;
4. Road Network Plan
5. Sustainability Strategy
6. Servicing Recommendations
7. Built Form – Neighbourhood Specific Design Guidelines

For detailed Technical Reports please refer to Part 6 Appendix A-E. For a detailed description of the Sports Campus development and implementation strategy please refer to Chapter 5.

Figure 22. Preferred Plan (with conceptual trail system)

Figure 23. Neighbourhood Structure Plan



4.2 Key Structuring Elements

4.2.1 NEIGHBOURHOOD STRUCTURE

The Study Area is bound by the D'Aubigny Creek to the west and north, Tributary E to the east and Shellard Lane to the south.

The neighbourhood structure of the North of Shellard Lane Neighbourhood Plan is based on the previously established Village Centre and Neighbourhood Residential areas as well as a newly identified institutional and recreation need. The neighbourhood structure is organized by an internal east-west major collector road that links the neighbourhood back to Shellard Lane. This collector is intended to provide the basic structure on which higher residential densities are located and future transit can circulate, as it is situated within a 400 metre or a 5 minute walk from the majority of the residential lands and the main institutional node.

4.2.1.1 The Village Centre & Neighbourhood Residential Area

The Village Centre and surrounding Neighbourhood Residential areas are located within the western portion of the Study Area; defined by Shellard Lane to the south, the Greenland System to the west and north, and a major collector road to the east. The residential area's core- the Village Centre- is located along the major collector road at the intersection with Shellard Lane. The Village Centre's strategic location further enables its twofold role as the local neighbourhood and broader West of Conklin community amenity area.

The majority of the residential areas are located within a 400 metre ratio or 5 minute walk to the Village Centre, while the Village Centre is located within a 200 metre or a 2.5 minute walk distance from proposed/potential transit routes.

The Neighbourhood Residential area will be comprised of the following:

1. a "Main Street" Gateway at the intersection with Shellard Lane;
2. a Village Centre composed of open space amenity areas, mixed use and higher density land uses; and,
3. neighbourhood residential areas composed of medium to low density residential areas.

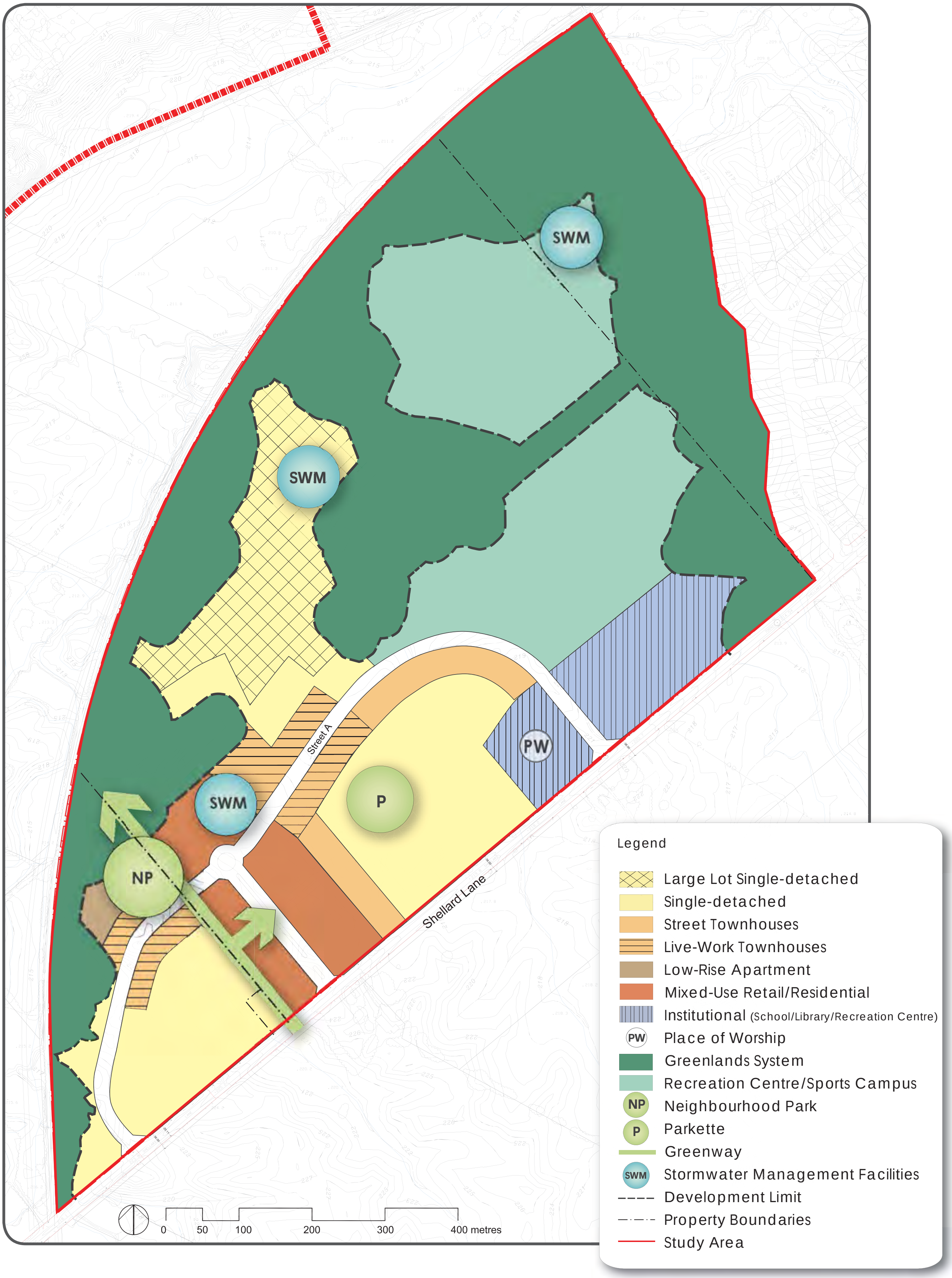
4.2.1.2 The Institutional Area

The institutional area is located on the east side of the Study Area, immediately adjacent to Tributary E. The intent of this designation is to assist in creating a "complete community" and to capitalize on the synergies that a variety of institutional uses and amenities generate by locating them in close proximity to each other.

The Institutional Area will encompass:

1. a high school building;
2. a library building;
3. a gym building;
4. a recreation centre building; and,
5. a place of worship.

Figure 24. Land Use Structure Plan



4.2.1.3 The Recreation and Sports Fields Area

The Sports Campus area is located to the north of the Institutional Area encircled and bisected by the surrounding greenlands system. Inherent to this Area's conceptual design was the desire to capitalize on the synergy and resources of the nearby Institutional Area and to minimize its traffic impact on the nearby residential neighbourhood. A detailed description of the Sports Campus is found in chapter 5 of this report.

4.2.2 LAND USE STRUCTURE

The Study Area is approximately 94.12 hectares (232.6 acres) in size with approximately 56.88 hectares (140.55 acres) of land with development potential. Of the developable lands, 34.22 hectares (84.56 acres) are allocated for neighbourhood residential purposes while 22.66 hectares (56 acres) are allocated for institutional and recreation/sports fields centre purposes. The proposed Neighbourhood and Recreation Plan can approximately accommodate for 667 (refer to table 2 Appendix B for overall development statistics) units and generate 1,890 residents and 162 jobs. Final population and jobs numbers will be determined once a definite development program is proposed.

The North of Shellard Lane Neighbourhood and Recreational Centre incorporates a large regional scale community facility within its developable lands impacting the overall density projections and therefore it is not expected to meet Provincial Growth numbers set for greenfield areas.

However, and more importantly so, we consider the proposed Neighbourhood Plan to achieve the intention of the Provincial Places to Grow vision by creating a mixed use, compact and pedestrian friendly neighbourhood while delivering a regional scale community amenity complex vital to the wellbeing of both the local community and the City's residents.

The anticipated development has development expectations that will take many years to achieve, and will be wholly dependant on market forces, the ability of the City to finance development and the motivation of the private sector to build the community. It is expected that at the time of development, further refinements to the development program may be made to respond to market realities; however, it is also expected that the overall land use and built form intent will be maintained.

The Study Area's proposed land use structure includes the following:

1. the Village Centre;
2. the Neighbourhood Residential;
3. the Institutional Centre; and,
4. the Recreation/Sports fields Area (refer to Chapter 5)

The land use structure seeks to:

1. provide an appropriate transition between the neighbourhood and the institutional and sports campus;
2. provide a balanced mix of uses that respond to the scale and function of the Village Centre;
3. provide a diverse residential form that responds to the scale and function of the Neighbourhood Residential and each community area; and,
4. provide an appropriate density and built form along the internal collector road and Shellard Lane.

Development yields were developed using the below described development program to further understand and analyze servicing, transit and transportation matters. Additional residential programs are encouraged to be explored and analyzed as in the case of introducing 12 metre single detached units as logical transition units between smaller and larger single detached homes.

The assumed development programs is:

1. 15 metres (49.2 feet) frontage single detached units – 58 units;

2. 9 metres (29.5 feet) frontage single detached units – 249 units;
3. 6 metres(19.7 feet) frontage townhouse units – 67 units;
4. 7 metres (23 feet) frontage live work units – 65 units;
5. 4 storey mixed use building with retail at grade and residential on top at 84 units per hectare – 197 units;
6. low rise apartments at 84 units per hectare - 31 units; and,
7. approximately 12,147 square metres (130,753 square feet) of combined mixed use and live work retail space.

Please refer to Part 6, Appendix B for a detailed development yield analysis. Table 2 reflects the study area overall development yield and density numbers while Table 3 reflects development yield and density numbers pertaining to City owned lands only.

The intent and vision for each development area, as described below, builds upon the West of Conklin Secondary Plan vision and is to be further complemented by the West of Conklin Design Guidelines and the Built Form – Site Specific Guidelines contained within this Neighbourhood Plan.

The Village Centre

As the primary destination place for the West of Conklin Community, the Village Centre incorporates retail and service commercial, recreational and cultural, as well as ground related housing and residential apartment buildings. A highly articulated built form and public realm is encouraged to further enhance the neighbourhood's "sense of place" such as specific access and parking requirements along the internal major collector road.

The Village Centre's role and function is further aided by the implementation of two character areas: the Gateway and Main Street.

1. The Gateway

The Village Centre's Gateway is proposed to be located at the western intersection of the internal major collector road and Shellard Lane. Its location responds to the broader community vision of locating all centres along the internal collector road that links all of the community's neighbourhoods. This also allows all centres to be within easy reach of all proposed/potential transit routes.

The Village Centre Gateway is envisioned to be developed as a four-corner mixed use node with retail at grade and residential and/or offices uses above. Development on all four corners is to be delivered in a pedestrian oriented manner to not only support transit but to contribute to the area's pedestrian vibrancy.

2. Main Street

The North of Shellard Main Street is to function as the primary pedestrian destination place within the West of Conklin community and is to include mixed uses with retail at grade and medium density residential/ offices above. The intent of this two-sided main street is to deliver a vibrant destination that fosters economic success by capitalizing on the synergies created by the nearby commercial, institutional, recreational and residential uses.

A high quality built form and public realm are encouraged as they further enhance the community's "sense of place".

The implementation of an urban context within this area hinges on the following:

1. the creation of a fine-grained street and block network; and,
2. the careful transition to adjacent neighborhood residential areas. Development along Main Street is predicated on a block depth that allows development to occur on either side of the block. Appropriately sized blocks permit development to occur in an incremental manner

as the community and the Main Street evolves. In this case, an average block depth of 80 metres has been assumed to accommodate for development fronting onto Main Street, as well as the internal neighbourhood, with space for an internal service lane.

Neighbourhood Residential

The Neighbourhood Residential area has a distinctive layout that responds to the following intent:

1. deliver a balanced exposure of the surrounding greenlands system to future development;
2. maximize access and views to open space amenity areas in accordance to CPTED standards;
3. maximize access and views to stormwater management facilities as integral elements of the open space system in accordance to CPTED standards;
4. maximize view and vistas opportunities throughout the community;
5. to facilitate pedestrian and vehicular movement by avoiding block lengths over 200 metres; and,
6. to provide for a variety of residential forms and tenure with the highest density forms located within 100 metres from the internal transit route.

The Institutional Centre

As the primary institutional destination for the West of Conklin Community, the Institutional Centre is composed of a place of worship, a secondary school, a library, a gym, and a recreation centre. A highly articulated built form and public realm with its main frontage directed toward Shellard Lane is encouraged to further enhance the centre's "sense of place".

The eastern most intersection of the major collector road and Shellard Lane is also identified as the area's Gateway. As in the case of the Village Centre's Gateway, its location responds to the broader community vision of locating centres along the internal collector road that links all of the community's neighbourhoods.. The institutional centre's proximity to the proposed/potential transit route is deemed vital to the promotion of transit ridership, the encouragement of pedestrian and cycling trips and to facilitate its convenience of access to a wide range of age and economic end users.

The development of all four corners at the intersection with Shellard Lane is to be delivered in a pedestrian oriented manner and is key to the neighbourhood's vision implementation.

The Sports Campus

While a full description on the Sports Campus conceptual design and implementation is found in Chapter 5 of this report, the key urban design strategy reflected on the Master Plan includes:

1. a clear and unobstructed view of all of the centre's amenity areas as per CPTED requirements;
2. a clear pedestrian, cycling and vehicular internal road network that minimizes the centre's inherent traffic impact of the nearby neighbourhood; and,
3. minimizing the grading of existing site conditions, not only for stormwater management purposes, but to conserve the site's character as much as possible

Based on this study public and stakeholder consultation process received input the following building footprint areas were used to further understand how the selected site would accommodate for the facilities:

a. 2 storey High School 102,525 sq.ft. (9,524 sq.mt.) without Library or double gym areas included;
b. 1 storey Double Gym 36,000 sq.ft (3,344 sq.mt.);
c. 2 storey Library 18,000 sq.ft. (1,672 sq.mt.); and,
d. 1 storey Recreation Centre 23,500 sq.ft. (2,183sq.mt.).

Figure 25. Open Space Structure Plan

Note: trail locations are conceptual only

4.2.3 OPEN SPACE STRUCTURE

The North of Shellard Lane Neighbourhood network of open spaces consists of a variety of elements ranging from a Sports Campus, Parkettes and Neighbourhood Parks to semi public open space areas associated with mixed use and high density residential developments linked by pedestrian oriented streets.

Inherent to the West of Conklin Secondary Plan, a wide range of open space typologies were incorporated into the open space structure on which the North of Shellard Lane neighbourhood open space structure was based. The open space network is predicated on the following strategy:

1. to design a visible and easy to access open space network composed of the following equally important elements:
   a. parkland areas;
   b. storm water management facilities; and,
   c. the street network.

2. to maximize access and views to the open space network;

3. to preserve and integrate existing hedgerows into the proposed street and block pattern;

4. to connect the proposed open space network to the greenlands system at strategic locations to minimize negative impacts to the greenlands system while promoting local residents enjoyment and stewardship of their surroundings; and,

5. to deliver a street and open space network that is designed to be pedestrian friendly.

The Community's proposed open space network is composed of:

1. The Greenland System;
2. a Neighbourhood Park;
3. a Parkette;
4. a Greenway;
5. Storm Water Management Facilities;
6. semi-public open space amenity areas; and,
7. a Sports Campus.

Greenland System

The Study Area can be described as a mosaic of agricultural land interspersed with field border hedgerows, cultural woodlands and thickets, deciduous woodlots, drainage swales, and forest and wetland communities associated with the D'Aubigny Creek riparian corridor.

The D'Aubigny Creek valley supports a cold water fishery and a provincially significant wetland complex and represents a core environmental feature. The valley corridor provides a linkage connection between the D'Aubigny Creek Swamp ESA to the southwest of the study area and the Grand River valley to the northeast.

The key elements of the greenland system for the North of Shellard Neighbourhood plan are as follows:

- D'Aubigny Creek;
- Tributary E;
- D'Aubigny Creek PSW;
- Floodplain areas;
- Upland forest and cultural vegetation contiguous with the D'Aubigny Creek riparian corridor;

- Central woodlot/wetland and hedgerow connections to D'Aubigny Creek and Tributary E;
- Drainage swale and hedgerow connection between PSW south of Shellard Lane and D'Aubigny Creek corridor; and,
- Buffers to environmental features.

The recommended greenland system for the study area incorporates 30 m buffers (as per the recommendations in the West of Conklin Secondary Plan) from the D'Aubigny Creek corridor (as defined as the greater of edge of stream bank, wetland boundary or dripline of contiguous upland vegetation). A 10 m dripline buffer from the edge of the central woodlot and hedgerows has also been incorporated into the greenlands system (as per Secondary Plan policies). Floodplain areas have also been taken into account in determining the location of the greenlands system. For consistency a conservative setback of 30 m was applied to the Tributary E watercourse and the D'Aubigny Creek system as a whole.

The key elements of the concept plan with respect to environmental protection are as follows:

- Control of post-development runoff to pre-development levels with Enhanced (former Level 1) stormwater management facilities, constructed as wetland type ponds;
- Cooling of runoff through a combination of outlet design (buried stone trench) and shade plantings along receiving channel;
- Minimizing cut/fill requirements to reduce alterations to surface drainage and infiltration;
- Low Impact Development stormwater management measures such as landscaped bio-swales, perforated drain tiles, permeable pavement systems, rainwater collection cisterns for irrigation, and minimal or no grade changes within buffer areas;
- Naturalization of buffers and parkland with common, native species indicative of the surrounding landscape and existing site conditions;
- Minimal hedgerow tree removal to accommodate road access to the sports fields; and,
- Reduced length of trail connections to the existing rail trail.

Overall, the proposed concept plan provides for a high level of environmental protection and enhancement through a combination of urban/park design, mitigation measures and habitat restoration opportunities. Follow-up environmental, hydrogeologic and environmental studies are recommended for the draft plan of subdivision phase and the detailed design of the sports complex to address matters related to protection of the surface water and groundwater regime, provincially significant wetlands, coldwater fish habitat, butternut and the servicing crossing of Tributary E.

The Neighbourhood Park

The Neighbourhood Park locational criteria is based on a 400 metre or 5 minute walk to the majority of the residential areas it serves. The Neighbourhood Park is primarily envisioned as an active and passive recreation and gathering open space for local residents. It is located at the end of the Village Centre's main street providing for a natural transition to the adjacent Greenland System and the lower residential densities.

The Parkette

The Parkette locational criteria is based on a 200 metre or 2.5 minute walk from nearby residential uses. The Parkette is primarily intended for passive recreation uses and provides for a smaller sub-neighbourhood scale open space. Because of its reduced size, unobstructed access and a clear view to this facility is paramount. No back lotting should be allowed.

The Greenway

The hedgerow found at the western most City lands property limit is proposed to be retained and, if possible, enhanced to provide for reduced land overflow capabilities. The Greenway functions not only as an open space link to the surrounding open space network but also as a natural transition element between the mixed use, higher density Village Centre and the Neighbourhood Residential designations.

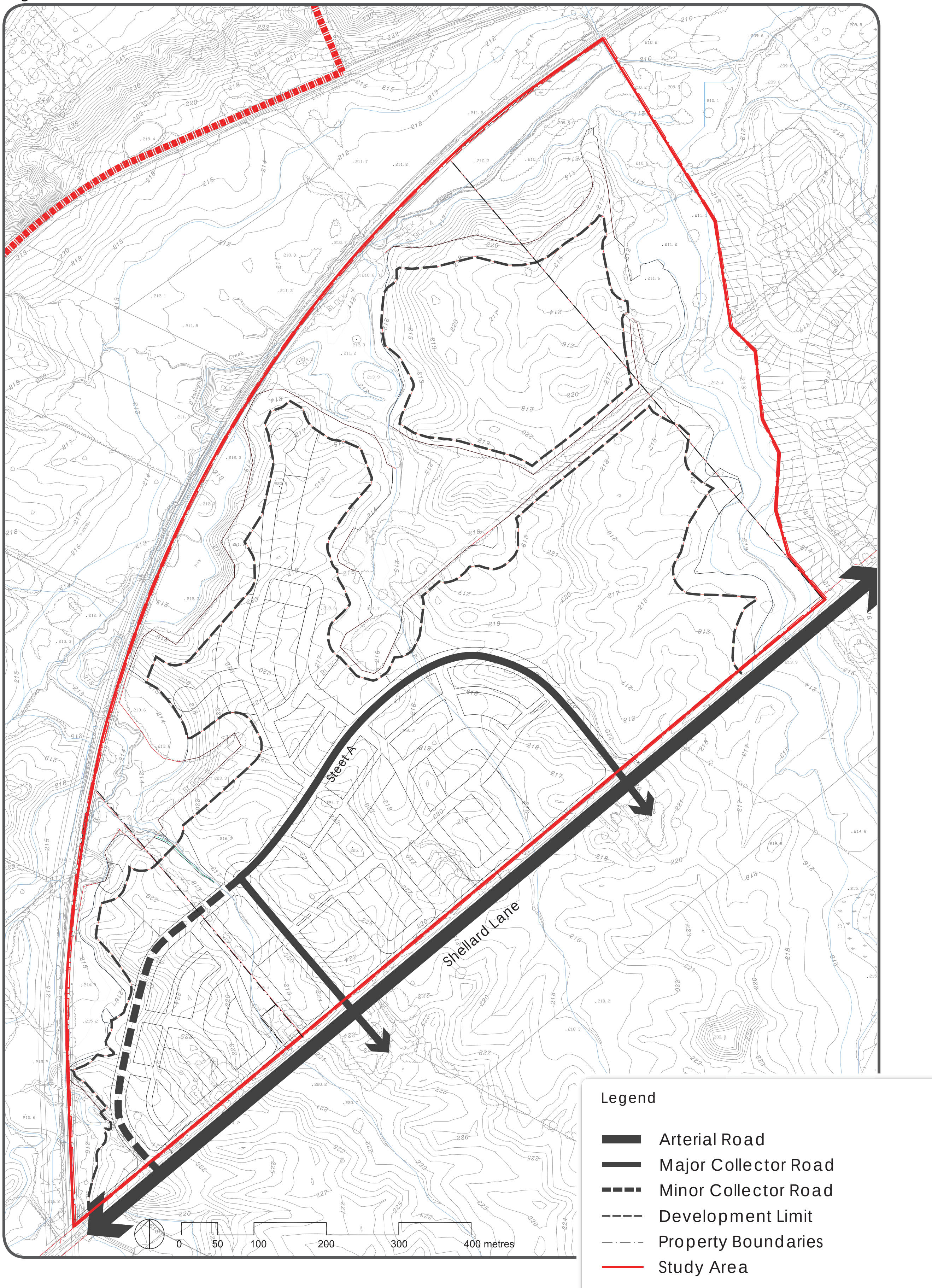
Storm Water Management Facilities

Stormwater management facilities are essential components of the open space network and will be designed as special landscaped amenities that are publicly accessible.

Semi-Public Open Space Amenity Areas

Semi-public open space amenity areas associated with privately owned mixed use and high density residential types of development are encouraged. These spaces range from urban squares to patios to terraces and courtyard greens. The spatial and functional characteristics of these amenity spaces will vary depending on the building typology and size of the block. However, these spaces are more intimate, scaled down extensions of the public realm and act as transitional spaces within residential areas.

Figure 26. Road Network Plan



4.2.4 ROAD NETWORK

The North of Shellard Lane Neighbourhood and Recreation Plan relies on a fine-grained street and block pattern with blocks that accommodate a variety of land use and built forms; and in the case of the Recreation Centre, act as a structuring element on which sport fields are ordered.

The illustrated road network is based on the following principles:

1. the provision of a well connected, integrated and permeable transportation network connecting this neighbourhood to the surrounding community and the broader community;
2. the preservation of the original collector road alignment as proposed in the current West of Conklin Secondary Plan;
3. the provision of the appropriate development interface conditions;
4. the delivery of a network composed of multi-purpose, urban streets which are both transportation corridors and pedestrian oriented places;
5. to balance the demands of pedestrians and cyclists, as well as vehicles, in the creation of attractive and comfortable public spaces where on-street parking is permitted;
6. to facilitate year round transit use through a streetscape that includes a variety of passenger amenities, and;
7. the creation of a beautiful streetscape design, with street trees as an essential component of their design.

The proposed road network is to be completed by a network of mid-block connectors associated with mixed use and medium to high density blocks that further facilitate vehicular and pedestrian movement.

The planned road network is intended to create a neighbourhood environment that stimulates high quality, ordered development and facilitates future development opportunities while preserving the community's vision.

Reduction in standard ROW may be supported through a detailed design study that includes the placement of services and parking allocations, to the satisfaction of the City of Brantford Planning and Engineering departments. Where discrepancies in ROW standards can not be recognized the West of Conklin Secondary Plan cross sections will take precedence.

Streets

Streets are a larger component of the public realm and attention to their aesthetic and functional design will ensure the achievement of the vision set out in this document. It is the objective of this plan to ensure beautiful and functional street design by implementing the recommended street typology found within the West of Conklin Urban Design Guidelines. Trees, on-street parking and a multi-modal character (pedestrian, transit, vehicular and cycling) are essential components.

As set out in the West of Conklin Urban Design Guidelines, the proposed Neighbourhood and Recreation Plan street typology is as follows:

Arterial – Shellard Lane – 36.0 metres

Shellard Lane provides access to the Study Area, its surrounding neighbourhoods and the broader City of Brantford. Its multi-modal function includes transit, vehicular, cycling and pedestrian traveling. The current West of Conklin Secondary Plan proposes a 35 metre right of way.
Streetscape elements put forward for consideration throughout a Municipal Class Environmental Assessment for improvements to Shellard Lane which is expected to be undertaken in 2011/2012 include:

1. a separate 3 metre cycling lane in each direction;
2. safe and appropriately sized pedestrian and cycling trail head locations that will link the proposed Shellard Lane pedestrian and cycling route to the existing and proposed cycling network;
3. transit facilities;
4. sidewalks on both sides of the road;
5. a distinctive boulevard landscaping strategy, with a "green promenade" of a double row of trees immediately adjacent to the right-of-way;
6. woody vegetation (tree) species that will mature to full canopy trees to provide shade in the summer and solar gain in the winter;
7. access to the school bus pickup-drop-off along the school's main façade fronting onto Shellard Lane;
8. as individual direct vehicular access to development is not permitted window streets running parallel to Shellard Lane or open ended cul-de-sac options are considered appropriate;
9. built form is to front directly or side-lot onto Shellard Lane with high quality architectural detailing and landscape features that address the road frontage. Reverse frontage is not permitted adjacent to Shellard Lane.;
10. a coordinated decorative, noise and privacy fence strategy is established from the onset; and,
11. appropriate culvert or bridge structure to accommodate for major storm channel crossing.

Major collector road – 25 metres

The internal collector road has been identified as a key multi-modal route trough the North of Shellard community. The community's Main Street and the two gateways are located along its route; as a result, it is envisioned as the spine for visitors and residents as well as a destination place. In its role, it should not function as a high speed road or vehicular through road.

The streetscape character includes:

1. a road surface of 15 metres;
2. shared parking and cycling lane in each direction;
3. optional parking lay-by on both sides of the road;
4. transit facilities;
5. sidewalks on both sides of the road;
6. diverse landscaped boulevards that include street trees that will mature overtime;
7. woody vegetation (tree) species that will mature to full canopy trees to provide shade in the summer and solar gain in the winter;
8. individual direct vehicular access to development is not permitted; and,
9. built form is to front directly onto this type of road with high quality architectural detailing and

landscape features that address the road frontage. Reverse frontage is not permitted adjacent to the Major Collector road.

Major Collector road with Median - 25.5 metres

Main Street is envisioned as a pedestrian oriented, highly articulated streetscape where public events could take place. A high quality public and private realm is encouraged as set out by the West of Conklin Urban Design Guidelines and this report's Built Form – Site Specific Guidelines. The introduction of a planted median is intended to signalize the transition and extent of the Main Street as a particular character area and calm traffic.

While a change in the right of way is desirable it should not come at the expense of creating a larger than 25.5 metre right of way. A larger right of way will defeat the very intention of creating a well defined pedestrian friendly main street.

The streetscape character includes:

1. a road surface of 15.5 metres, including a 3.0 metre planted median;
2. shared parking and cycling lane in each direction of 2.75 metres;
3. transit facilities;
4. sidewalks on both sides of the road and wide enough to accommodate for comfortable walking and outdoor cafes along Main Street;
5. diverse landscaped boulevards that include street trees that will mature overtime;
6. woody vegetation (tree) species that will mature to full canopy trees to provide shade in the summer and solar gain in the winter;
7. individual direct vehicular access to development is not permitted; and,
8. built form is to front directly onto this type of road with high quality architectural detailing and landscape features that address the road frontage. Reverse frontage is not permitted adjacent to the Major Collector road - Main Street.

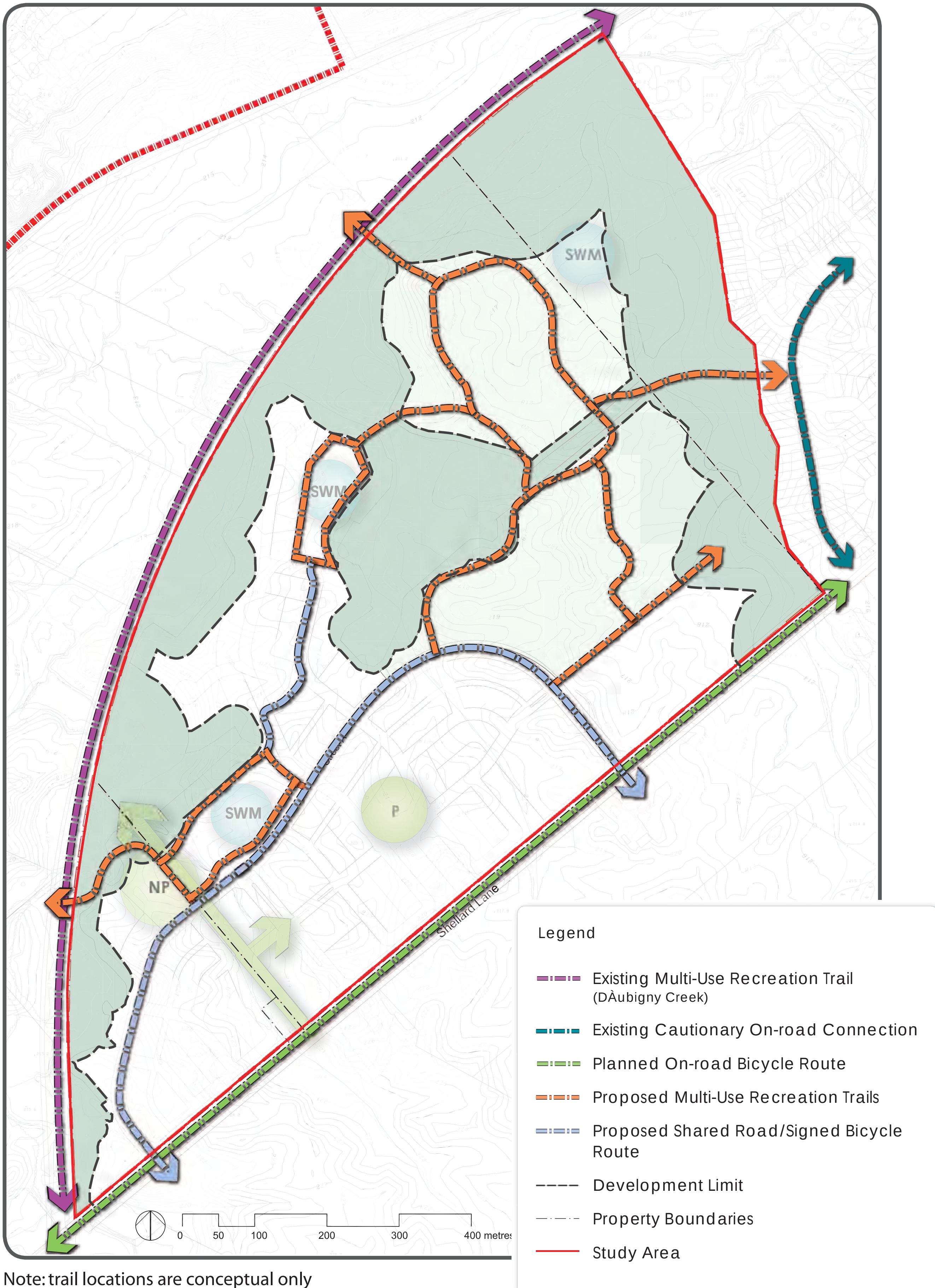
Minor Collector Road – 22 metres

The internal minor collector road completes the internal collector road network as established in the West of Conklin Secondary Plan. With an overall residential character, this road provides for a natural transition between Main Street and the residential area to the west.

The streetscape character includes:

- a road surface of 12 metres;
- on-street parking on both sides;
- transit facilities;
- on street cycling;
- sidewalks on both sides of the road;
- diverse landscaped boulevards that include street trees that will mature overtime;
- woody vegetation (tree) species that will mature to full canopy trees to provide shade in the summer and solar gain in the winter;
- individual direct vehicular access to development is limited; and,
- built form is to front directly onto this type of road with high quality architectural detailing and landscape features that address the road frontage. Reverse frontage is not permitted adjacent to the Minor Collector road.

Figure 27. Conceptual Trail Network Plan



Note: trail locations are conceptual only

Local Road – 18 metres

These streets are residential in nature. Their streetscape character includes:

- a road surface of 9 metres;
- on-street parking on one side;
- sidewalks on both sides of the road;
- diverse landscaped boulevards that include street trees that will mature overtime;
- woody vegetation (tree) species that will mature to full canopy trees to provide shade in the summer and solar gain in the winter;
- individual direct access to development is permitted; and,
- local roads that are single loaded may include a 16 metre right-of-way, and a reduced boulevard abutting the publicly owned storm water management facility, open space, parkland or environmental feature.

Lanes – 8.5 metres

Rear lanes help to create beautiful streets as parking driveways and service areas can be located along them, while permitting full-front elevation buildings to face the street as well as contiguous on-street parking opportunities.

Lanes, as proposed in the context of this Neighbourhood plan should be understood as part of an overall multi-modal system without which the delivery of the Neighbourhood's key community principles, as identified at the initial workshop sessions, could not be delivered.

Successful multi-modal road networks that incorporate a lane system are usually publicly owned. Publicly owned lanes allow for the often preferred free hold land tenure option without the need of condominium-common element arrangements while delivering infrastructure network services by accommodating for some utilities, facilitating waste collection and allowing for an increased on-street parking capacity. The plan's proposed lanes are envisioned as City owned public realm elements.

An 8.5 metre lane is proposed for the North of Shellard community along the Major and Minor Collector roads as well as strategically located areas where direct fronting is to enhance the public realm experience such as Main Street or housing directly fronting onto parks.

Traffic Circles

Traffic circles are intended to calm traffic and direct traffic flows without the necessity of requiring stop signs at intersections. The Neighbourhood proposed traffic circle is intended to function as the northern most visual gateway of Main Street that the intersection with the connecting minor collector road to the west, the main collector road to the east and the open space and greenlands system to the north.

Refer to circle radius requirements found in the Southwest Brantford, West of Conklin Road Study Area, Urban Design Guidelines.

Trail Network

It is the intent of this Neighbourhood Plan to enhance and connect the existing Gordon Glaves Memorial Path System to future trail links to and from the Study Area. Cycling and/or multi use trails linking the community and sports campus to the broader community and the T.H. & B. Rail Trail system are encouraged and should be located and built to the City's and Conservation Authority's satisfaction.

The proposed cycling network is intended to deliver a route that encourages cycling as a safe and viable multi-modal commuting option as well as a cycling as a recreational activity. Final trail aligment and crossings of environmentally sensitive areas will need to be verified and approved by the Grand River Conservation Authority and City of Brantford staff.

The community's trail network will consist of:

1. a dedicated bicycle route along Shellard Lane;
2. a shared bicycle route along the internal major and minor collector road;
3. safe road-crossings at appropriate locations;
4. informal on-road cycling on all local roads;
5. a Sports Campus multi-use trail network;
6. a neighbourhood park, parkettes and storm water management facilities multi-use trail system; and,
7. cycling and pedestrian amenities such as benches, trail head signs and bicycle posts located at potential rest points such as parks and storm water management facilities.

Please refer to Part 7, Appendix C for the supporting Transportation Assessment and Management Report by Poulos & Chung.

4.2.5 SUSTAINABILITY STRATEGY

The North of Shellard Lane community is envisioned to achieve social, economic and environmental sustainability at the community and building scale.

Community wide strategies put forward by the proposed Land Use, Open Space and Road Structure will ensure the delivery of:

1. a socially diverse community that delivers a wide range of accommodation to a wide range of people with different backgrounds, ages, lifestyles and economic status;
2. an economically active community that accommodates for a wide range of uses including commercial, recreational and employment uses.;
3. an environmentally sound community that takes a comprehensive approach to the impacts of construction and occupation inherent to all development. By addressing land use, open space and road network issues, the Master Plan seeks to deliver a responsible, innovative, healthy, energy efficient and transit supportive community; and,
4. a Master Plan layout that encourages the implementation, at the development stage, of a sound conservation and stewardship program that raises local and larger community resident's awareness of the role and function of the surrounding greenland system.

Opportunities for the development of sustainable solutions should be implemented through a comprehensive policy on sustainability that encourages the public and private sectors into delivering high quality energy efficient buildings.

Energy

The goal for energy and utilities is to encourage and ensure the conservation and wise economic, use of energy and to minimize adverse effects caused by its provision and to consider the inclusion of alternative energy sources. Suggested initiatives include:

1. to reduce demand for energy from the grid and encourage renewable energy production. Use of alternative energy sources can reduce pollution and increase the efficiency of the power system. Renewable energy sources that could be employed may include the use of solar thermal and photo voltaic equipment, geoexchange technologies, and/or wind power. Proposed alternative energy source(s) could be used in combination with energy from the grid;
2. to encourage passive solar orientation to permit enhanced energy efficiencies by creating optimum conditions for the use of passive and active solar strategies;
3. to encourage development to implement block design street alignment within 15 degrees of geographic east-west to maximize passive solar orientation of buildings front and rear windows;
4. to establish targets for reducing greenhouse gas emissions and improving air quality that comply with Canada's target of a 20% CO2 reduction below 2006 levels by 2030 and 60%-70% reduction by 2050;
5. to promote the use of alternative community energy generation systems such as district energy;
6. to encourage developers to include an owner/ tenant education package at the time of purchase or rental regarding household activities to improve energy and water efficiency, access to transit, location of recycling station, etc;
7. to promote the use of transit and active transportation as alternative modes of transportation within the Region; and,
8. to encourage energy reduction at a local level to ensure public awareness. Include various measuring and benchmarking software options, such as zerofootprint, on local municipal websites to assist local decision making with solutions to reduce energy consumption and provide public awareness.

Water

To increase public awareness of the importance and value of an adequate, sustainable supply of clean water for both human use and the natural environment through:

1. the implementation of Low Impact Design Standards that emphasize the use of Bio-Swale/ Innovative Stormwater practices, Constructed Wetlands, At-source infiltration, greywater re-use system and alternative filtration systems such as a Treatment Train, Water Conservation Measures, and Cisterns and Rain Barrels;
2. the introduction of green infrastructure, such as bioswales, within the public right-of-way to enhance ground water infiltration and improve water quality as part of a comprehensive water management plan;
3. the implementation of a comprehensive rainwater and water recharge strategy in conjunction with required stormwater management facilities;

4. the implementation of Green Infrastructure at the neighbourhood scale to utilize the absorbing and filtering abilities of plants, trees and soil to protect water quality, reduce runoff volumes, and recharge groundwater supplies;
5. the use of permeable pavement instead of standard asphalt and concrete for surfacing sidewalks, driveways, parking areas, and many types of road surfaces;
6. the implementation of policies for Stormwater retention & run-off such as:
   a) retain stormwater on-site through rainwater harvesting, on site infiltration, and evapotranspiration (green roofs, rain barrels, permeable paving, green streets, infiltration trenches and absorbent landscaping)
   b) 80% of total suspended solids removed from all runoff leaving the site
   c) consider the inclusion of third pipe greywater systems and rain water harvesting for watering lawns, gardening, to reduce demand on potable water use
   d) direct flow to landscaped areas and minimize the use of hard surfaces in order to reduce the volume of run-off into the storm drainage system.
   e) increase vegetation to retain water and integrate features like rock marshes to force water to seep into ground.
   f) store snow piles away from drainage courses and storm drain inlets.
   g) use of infiltration trenches, dry swales and naturalized bioswales adjacent to parking areas to improve on-site infiltration.
   h) ponds are designed as part of the natural landscape, and replicate organic shapes with natural landforms in the area rather than geometric forms with standard slope gradients.
7. the implementation of policies for Pond Design and Landscaping such as:
   a) stormwater ponds are located offline, and act as a buffer to environmental features.
   b) ponds are designed as key focal/visual features within the community in addition to functional objectives related to flow moderation and water quality.
   c) native species and flood tolerant edge plants (such as herbaceous and woody vegetation) are used to stabilize banks of ponds. The perimeter of the permanent pool is planted with emergent, strand, and submerged species to improve the aesthetics and enhance the performance of the facility.
   d) ponds are designed as part of the overall pedestrian and trail system with view points and interpretive signage. Public walking/cycling trails encircle ponds and extend along stormwater channels where possible.
   e) where public access is discouraged, living fences and barrier planting is utilized around the perimeter of the ponds in place of fencing

Waste

To effect an attitudinal change that will regard waste as a resource in transition waiting to be reclaimed and for which re-use or alternative uses are available and desirable. Initiatives that should be explored are:

1. the implementation of policies that emphasize the benefits of Zero garbage target, and targets for a higher diversion rate in recycling;
2. the implementation of policies that set targets for the diversion of:
   a) solid waste - 60% waste diversion to landfill sites
   b) construction waste - Recycle and/or salvage at least 50% of nonhazardous construction and demolition debris, designated area on site for recyclable materials
   c) recyclable waste - recycling services - regional or municipal
   d) compostable waste - comprise up to half of household waste. Diverting these materials from the waste stream for processing into compost is a key part of achieving the zero garbage waste goal. Implement a region wide composting system (eg. Edmonton, Halifax, Toronto)
3. careful monitoring of emissions and international best practice standards are employed; and,
4. expansion of waste diversion for public and private schools.

Air Quality

To reduce, in concert with the Federal Government, the Province, the City of Brantford other municipalities, public interest groups and the private sector, the emissions of greenhouse gases. To improve air quality and to address the impact of climate change the following initiatives should be explored:

1. the development of 'complete' communities characterized by greater densities placed at neighbourhood centres, mixed use nodes, or near transit facilities, mixed land uses, mix and diversity of housing types, connected and walkable road patterns, and active transportation;
2. the promotion of alternative modes of transportation such as public transit and bike paths. Promote active transportation to reduce automobile dependence and transit within a 400 metre walking distance of residential development.
3. the provision of the minimum number of parking spaces allowed under the Zoning Bylaw:
   a) Mixed use developments should include shared use of parking among uses that have different peaking characteristics.
   b) Dedicated priority parking spaces for carpool ride sharing.
   c) Dedicated priority parking spaces for ultra low emission vehicles.
4. the separation of sensitive land uses from pollution source through land use planning and zoning to ensure the separation of air pollutant sources from sensitive land uses
5. the application of high energy efficiency standards, such as EnerGuide 85 efficiency rating, and renewable energies for new buildings to reduce building related air pollution.
6. the adoption of landscaping policies and practices that would reduce emissions of greenhouse gases and air pollutants and reduce the urban heat island effect. Establish a green strategy for tree planting, connected open space system, green roofs and community gardens.

Green Buildings

To promote innovative programs to encourage the design and construction of residential, commercial and institutional energy efficient green buildings through:

1. innovative residential development designs which contribute to affordability and energy and natural resource conservation;
2. the promotion of Energy Efficiency:
   a) Residential buildings energy demand achieves an EnerGuide 85 energy efficiency rating for residential buildings
   b) Mid to high-rise residential and non-residential energy demands improve by 40% over the Model National Energy Code for Buildings (MNECB) as demonstrated by third party certification
   c) Municipal building achieves a LEED Silver Certification
   d) Building includes green or white roof technology
3. the promotion of Water Efficiency:
   a) All buildings comply with Ontario's building code required water fixtures efficiency
   b) Building uses Low Impact Development strategies to deal with on-site run-off and heat island effects
   c) Water metering is available
   d) Building's landscaping is water efficient and drought resistant by using native planting materials
   e) Pre design for grey-water pipe infrastructure
4. the best practice accreditation of buildings through a third-party certification programs such as Energy Star, LEED H, LEED NC, LEED for Schools, BREAM, etc. All public buildings should achieve a minimum gold certification level; and,
5. the promotion of Green Materials:
   a) Promote construction best practices that reduce construction waste
   b) Incorporate green building material standards to reduce impact on the environment and ensure materials are purchased/obtained from a responsible ethical sources % of materials from certified local businesses

Heat Island Effect Reduction

To provide a strategy for urban heat island reduction through the use of cool or green roofs. Initiatives to consider are:

1. the implementation of policy that requires building(s) to incorporate green or living roofs and to include light coloured/high reflectance roofs;
2. to provide for Green roofs for 80% of all high density development;
3. the incorporation of both high reflectance and vegetated (green) roofs for at least 50% of all new buildings with a flat roof; and,
4. to develop a heat island reduction strategy for community and public buildings to install green roofs with 50% coverage, remainder covered with light coloured material.

4.2.6 SERVICING STRATEGY

a) Population Projection and System Demands

Based on the Preferred Land Use Plan, the projected serviced population within the North of Shellard Neighbourhood will be 1,658 persons plus jobs. Based on this serviced population, the design demands for the North of Shellard Neighbourhood are outlined in Table 5 below.

Water and Wastewater System Demands		
Parameter	Water Distribution System	Wastewater Collection System
Population	1,658	1,658
Service Area (ha)	23.56	23.56
Average Daily Flow	0.746 MILD	1.153 MILD
Maximum Day Factor	2.0	N/A
Peak Hour Factor	3.0	3.65
Fire Flow (L/s)	150	N/A
Peak Design Flow (L/s)	N/A	36.3

Table 5. SWater and Wastewater System Demands

b) Water Distribution System

In order to provide adequate potable water distribution to the North of Shellard Neighbourhood, a network of new distribution mains will be required to be extended from the current limits of the City's distribution system.

The proposed water distribution system layout is presented on Fig 31. It is proposed to extend the 400 mm trunk watermain on Shellard Lane from McGuiness Drive approximately 450 m westerly to the east leg of the new Collector Road. From the intersection of the Collector Road and Shellard Lane, a 300 mm watermain would be extended internally through the development along the Collector Road back to Shellard Lane near the west end of the Neighbourhood. This 300 mm trunk watermain would then be extended through Neighbourhood 3 to complete the loop to Blackburn Drive.

In the short term, (i.e. before development of Neighbourhood 3) water will be distributed through this Neighbourhood through the single feed on Shellard Lane, which raises some concerns related to security of supply. To address this issue, the City may wish to consider construction of a second feedermain from McGuiness Drive to the Collector Road, through the Park area. Construction of this facility would involve an additional crossing of Tributary E north of Shellard Lane, which should be completed using trenchless installation techniques.

The estimated cost to provide water distribution for the North of Shellard Neighbourhood is $2,476,000 including contingencies, engineering and HST. The estimated cost to provide a second feedermain connection to the North of Shellard Neighbourhood is $349,000 including contingencies, engineering and HST. A detailed estimate breakdown for this work is provided in Appendix E.

c) Wastewater

In addition to the North of Shellard Neighbourhood, there is a small triangular parcel of land located west of the Rail Trail, south of Shellard Lane, and bounded on the west by the City limits. This parcel of land is approximately 4.0 ha in size, and would accommodate a future population of approximately

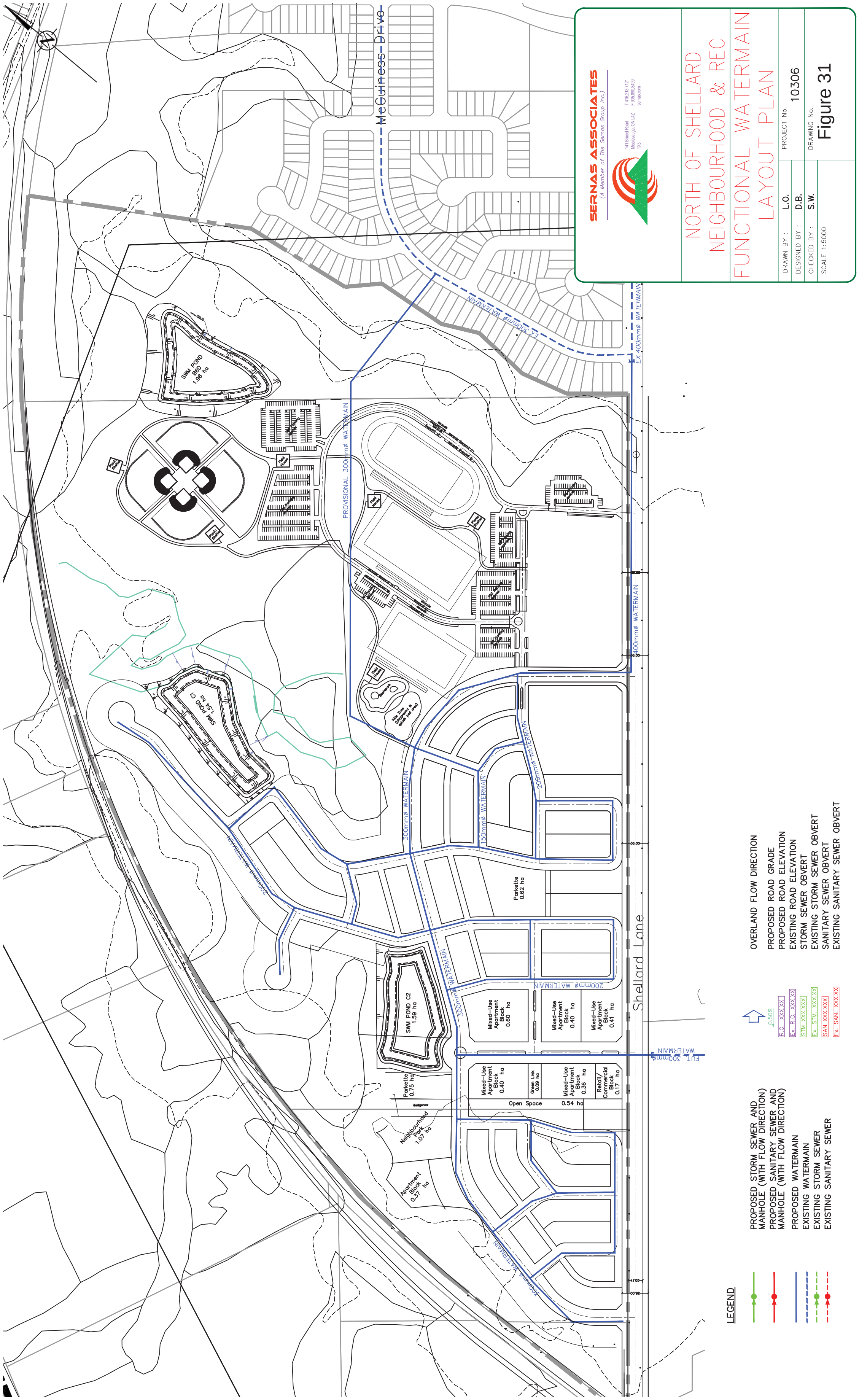


Figure 28. Functional Watermain Layout Plan

220 persons, at an assumed density of 55 ppha. In the event that sanitary services for this remnant parcel are provided through the North of Shellard Lane Neighbourhood, the Average Daily Flow would increase to 1.321 MLD, and the Peak Design Flow would increase to 40.8 L/s.

As noted in Section 2.5.1, there are two potential sanitary sewer outlets potentially available to service the North of Shellard Neighbourhood, as described below.

Alternative 1 - McGuiness Drive Sub-Trunk Outlet

All wastewater generated from the North of Shellard Neighbourhood could be directed to the McGuiness Drive Sub-Trunk sewer, as shown on Fig. 32. The existing sewer has a nominal capacity of 96 L/s, which is adequate to accommodate the wastewater generated from the North of Shellard Neighbourhood.

Based on this alternative system layout, all areas within the North of Shellard Neighbourhood can be serviced with a conventional gravity collection system and normal sewer depths.

In order to extend the sub-trunk sewer from McGuiness Drive, a new watercourse crossing of Tributary E will be required. Installation of the sewer extension within the Tributary E corridor should be completed using trenchless installation techniques, in order to avoid any disturbance to the tributary. GRCA has indicated that the Authority would prefer that any utility crossing of the tributary be completed within the Shellard Lane right-of-way, due to concerns related to the long-term maintenance of this infrastructure.

If the small triangular parcel located west of the Rail Trail is to be serviced through the North of Shellard Neighbourhood, a sanitary sewer could be extended to service this area from the western intersection of the Collector Road and Shellard Lane. However, in order to service this external parcel, the sewer along the collector road would need to be installed at a greater depth through the western portion of the Neighbourhood.

The estimated cost to provide sanitary servicing for the North of Shellard Neighbourhood, based on this layout, is $2,779,000 including contingencies, engineering and HST. The premium cost to deepen the sewers through the North of Shellard Neighbourhood to provide an outlet for the lands west of the Rail trail is estimated to be $222,000. A detailed estimate breakdown is provided in Appendix E.

Alternative 2 – Shellard Lane Trunk Sewer Outlet

All wastewater generated from the North of Shellard Neighbourhood could be directed to the Shellard Lane Trunk sewer, as shown on Fig. 33. The utility crossing of Tributary E would be located within the Shellard Lane right-of-way, to address the concerns raised by GRCA.

This alternative has the benefit of providing an outlet for planned development south of Shellard Lane and, as such, the cost of the trunk sewer extension could be potentially shared between the benefitting parties. However, one of the major landowners within Neighbourhood 3 has indicated they would not participate in the costs for construction of a sanitary outlet on Shellard Lane, since an adequate outlet is available internally in Neighbourhood 3.

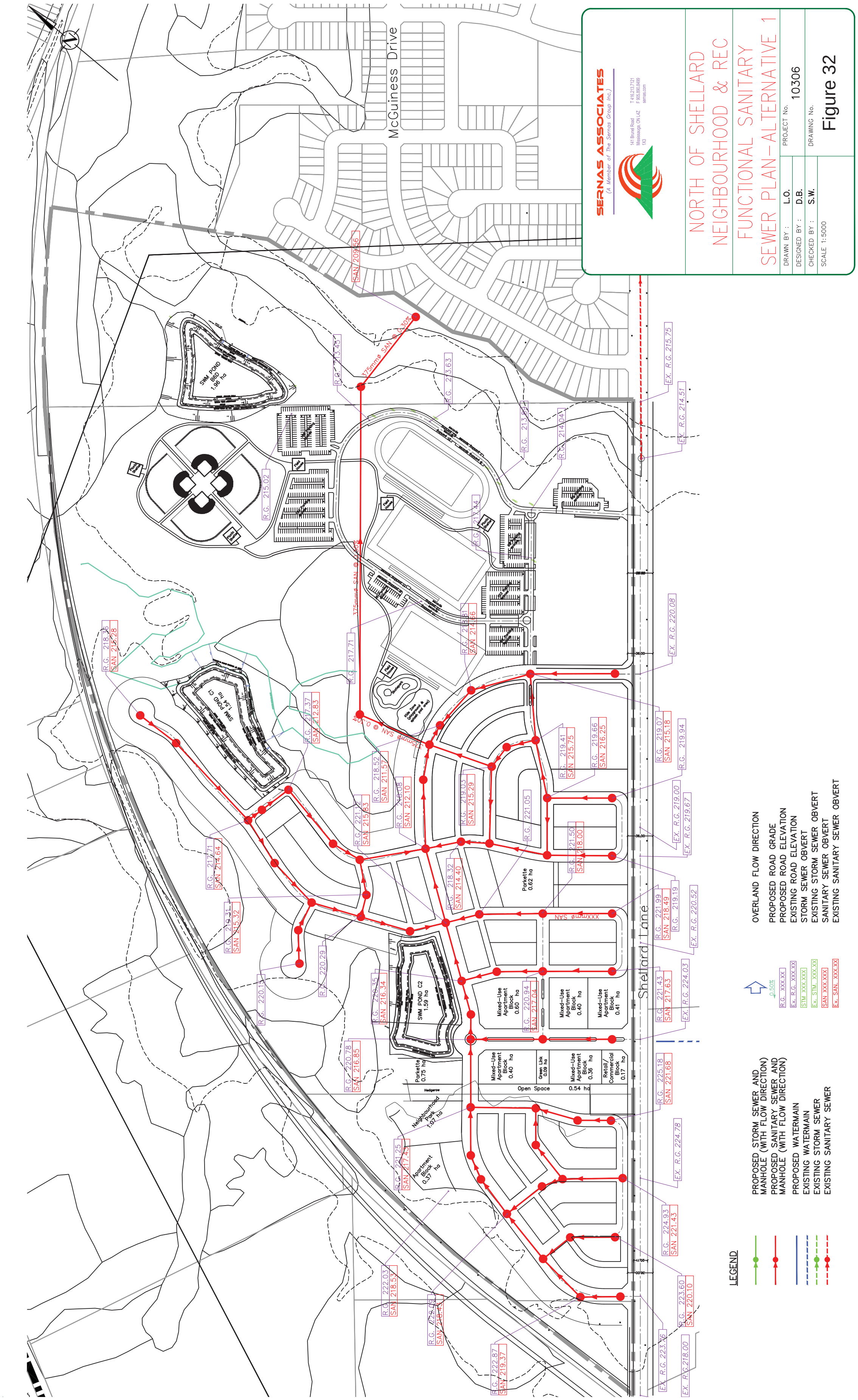


Figure 29. Functional Sanitary Sewer Plan- Alternative 1

Since the existing trunk sewer is at a higher elevation than the sub-trunk sewer, and since the sewer is located further away from the north limits of Neighbourhood 2, servicing of the northern portions of the North of Shellard Neighbourhood becomes more challenging due to grading constraints with this Alternative. Conventional depth sewers can be achieved throughout the North of Shellard Neighbourhood; however, there is very little tolerance for construction deviation.

Servicing of the remnant parcel between the Rail Trail and the City's western boundary can be achieved; however, the sewer on Shellard Lane would need to be extended along the full length of Shellard Land past the Rail Trial.

The estimated cost to provide sanitary servicing for the North of Shellard Neighbourhood, based on this alternative layout, is $2,819,000 including contingencies, engineering and HST. The additional cost to provide an outlet for the lands west of the RailTrail is estimated to be $977,000. A detailed estimate breakdown is provided in Appendix E.

It is recommended that Sanitary Servicing Alternative 1 be selected based on the lower estimated capital cost. This recommendation is subject to the ability to obtain a Permit from GRCA for the crossing of Tributary E outside of the Shellard Lane ROW. We note that the economics our recommendation is based on could be altered based on cost sharing with lands within Neighbourhood 3. This should be explored further with the land owners south of Shellard Lane. Additionally the City has indicated that a sewer along Shellard lane may be eligible for Development Charge credits. If the DC credits applied to Alternative 2 and not Alternative 1 this could significantly impact the relative economics of the options.

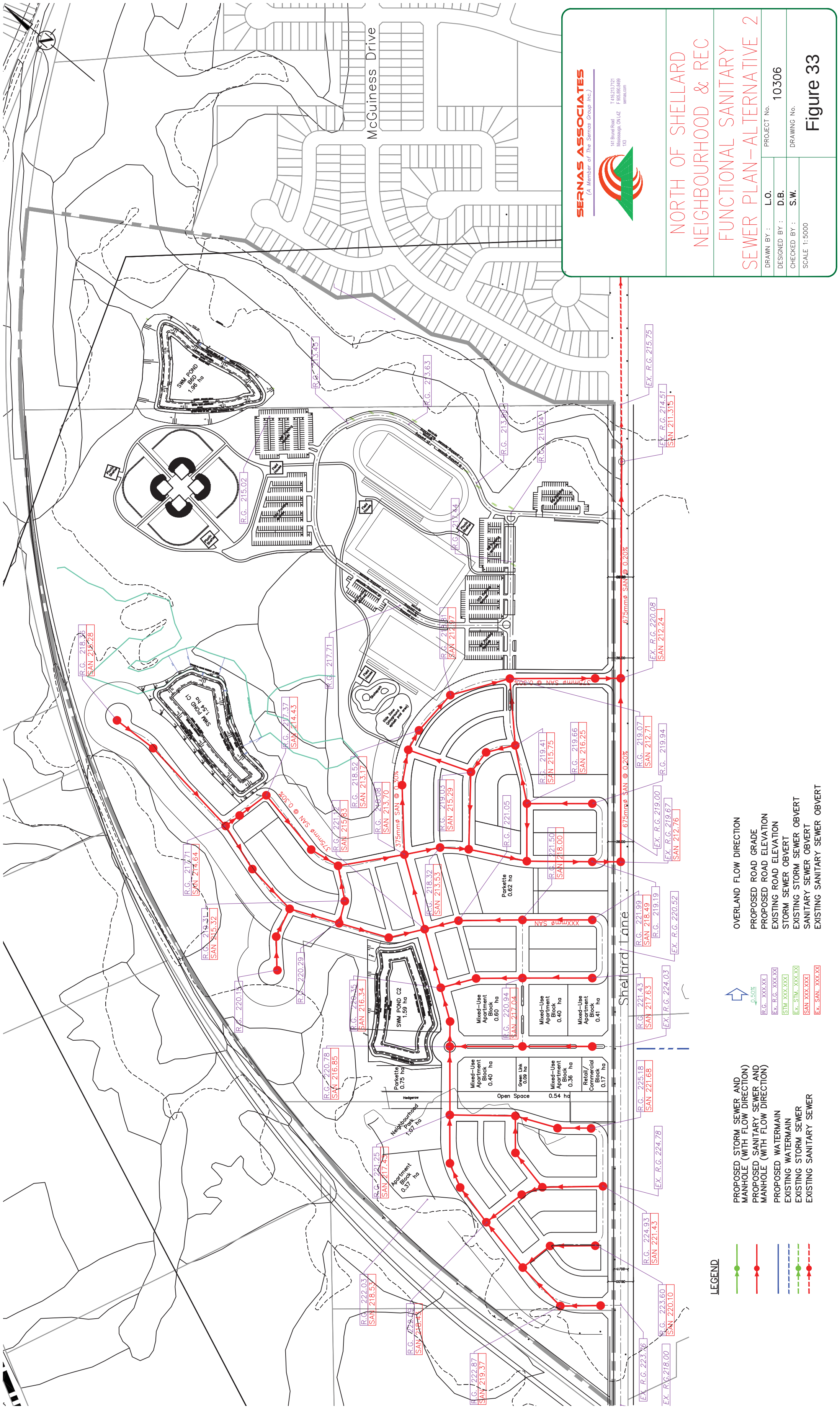


Figure 30. Functional Sanitary Sewer Plan- Alternative 2

d) Stormwater Management

A preliminary analysis of the stormwater management requirements for development of the North of Shellard Neighbourhood was undertaken. The proposed water distribution system layout is presented on Fig 34. Three (3) stormwater management facilities are proposed for the Neighbourhood; one facility within Zone B and two facilities in Zone C. These stormwater management facilities were identified in the West Conklin Secondary Plan Master Servicing and Traffic Report (2007) as Pond B6D, Pond C1 and Pond C2. Hydrologic modeling from the MESP has been updated for each facility based on the current preferred plan.

Pond B6D

The post-development drainage area (Sub-catchment 251) to Pond B6D will include the proposed recreational lands, approximately 15.4 ha, located north and east of the proposed collector roadway. Approximately, 5.3 ha of the proposed recreational lands will drain uncontrolled to maintain flows to Tributary E of D'Aubigny Creek.

The stormwater management pond will be designed as a wet pond facility with Enhanced Level of Quality control, and peak flow controls to restrict post-development runoff rates to pre-development rates for the 1:5 and 1:100 year return event storms. The pond outfall will be directed to the main channel of D'Aubigny Creek. An emergency overflow will also be incorporated into the facility to direct overflows to Tributary E.

Due to grading constraints within the sub-catchment, it will be difficult to convey major system flows from the entire area to the pond facility. Accordingly, it is proposed to provide different management schemes for different sub-areas within the drainage shed.

The soccer, football and baseball fields all are proposed to have underdrains connected to the minor system directed to the SWM facility. Overland flow will drain to Tributary E.

The impervious areas associated with the playing fields will be connected to the minor system and directed to Pond B6D. This includes bleachers, pathways, shelter, field house, playground and track around the football field.

The parking area and building area of the proposed Community Centre adjacent to Shellard Lane will have local on-site peak flow controls. The attenuated runoff from this area will be piped to the pond. Storage will be provided on the parking lots to attenuate the 100-year post-development runoff to the 5-year post-development rate.

The three parking areas associated with the recreational lands will all provide local on-site peak flow control and to convey the runoff by pipe flow to the pond. Storage will be provided on all three of the parking lots to attenuate the 100-year post-development runoff to the 5-year post-development rate.

As mentioned previously, a portion of the proposed recreational lands lands will be directed to Tributary E uncontrolled to maintain flow in the creek. This area includes all pervious lands around the soccer and football fields. This is considered clean water, and will not require any quality control.

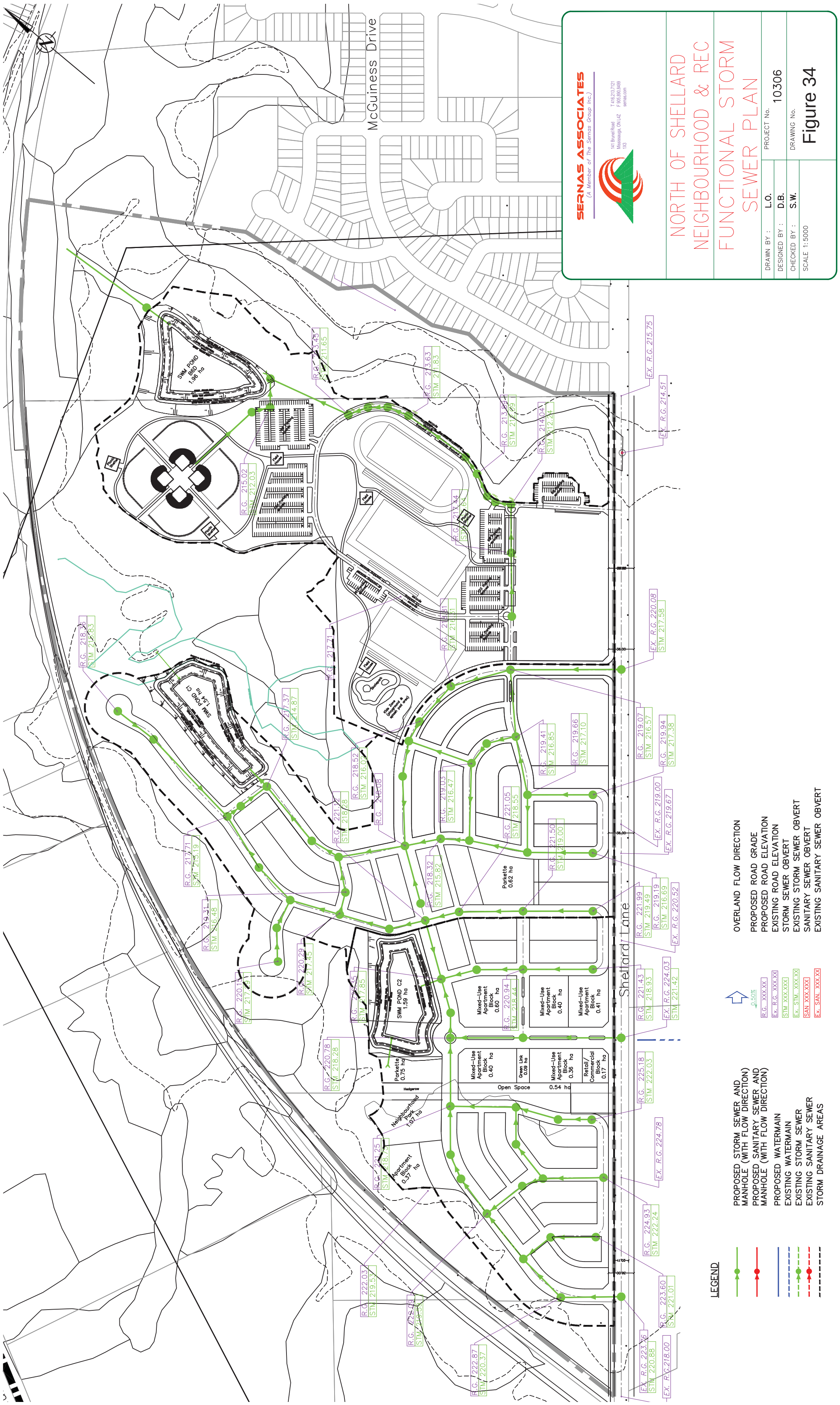


Figure 31. Functional Storm Sewer Plan

Pond B6D will be designed as a wet-pond facility and will be incorporated into the existing terrain wherever possible. The required pond block is 1.96 ha, as shown on Fig. 34 SWM Pond. The minimum required storage volumes are 4,300 m3 for permanent pool, 2926 m3 for extended detention, and 9,356 m3 for active storage.

Pond C1

Pond C1 will service a drainage area of approximately 19.1 ha, identified as Sub-Catchment 261. This facility will be designed as a wet pond facility to provide an Enhanced Level of quality control, and peak flow controls to attenuate post development runoff rates to pre-development levels for the 1:5 and 1:100 year events. The pond will outlet north to the main channel of D'Aubigny Creek.

The required storage volumes for Pond C1 are approximately 4,500 m3 for permanent pool, 3,037 m3 extended detention storage, and 15,000 m3 for active storage. Fig. 34 SWM Pond provides a preliminary design for the required SWM facility, within a Block area of approximately 1.54 ha.

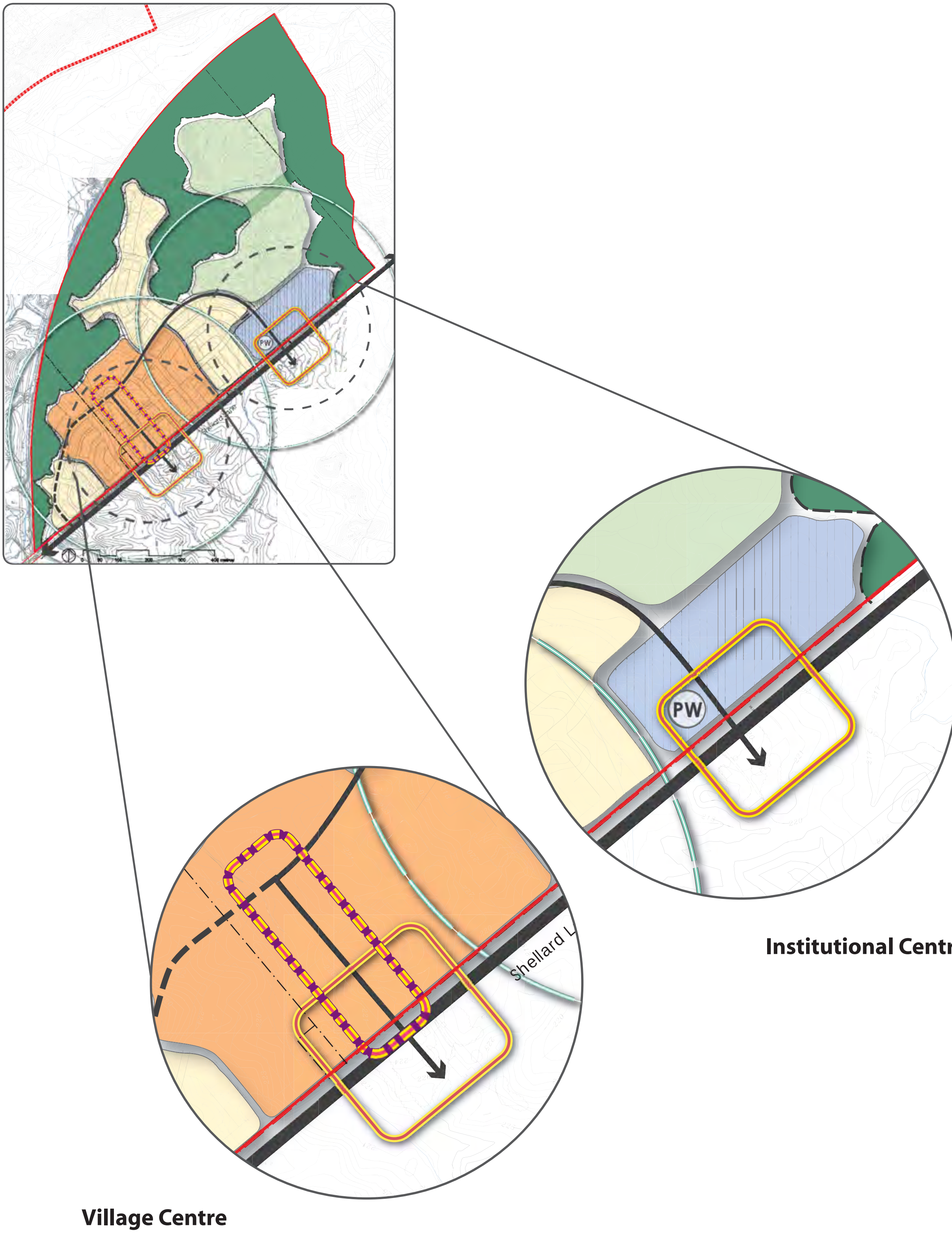
Pond C2

Pond C2 will service a drainage area of approximately 17.5 ha, identified as Sub-Catchment 272, within the Neighbourhood 2 lands, as well as, 11.1 ha of drainage area from lands from Sub-catchment 271 south of Shellard Drive in Neighbourhood 3. This facility will be designed as a wet pond facility to provide an Enhanced Level of quality control, and peak flow controls to attenuate post development runoff rates to pre-development levels for the 1:5 and 1:100 year events. The pond will outlet to Tributary G.

Runoff from environmental area within Neighbourhood 3 will be conveyed across Shellard Lane through the existing (or replaced) culvert, then northerly through the Open Space Block in a bio-swale conveyance channel. Flow will be intercepted at the collector road and piped to the Pond C2 outlet location.

The minimum required storage volumes required for Pond C2 are approximately 5,800 m3 for permanent pool, 4,585 m3 for extended detention, and 12,000 m3 for active storage. Fig. 34 SWM Pond provides a preliminary design for the required SWM facility, within a Block area of approximately 1.59 ha.

Figure 32. Centres



4.2.7 BUILT FORM- SITE SPECIFIC GUIDELINES

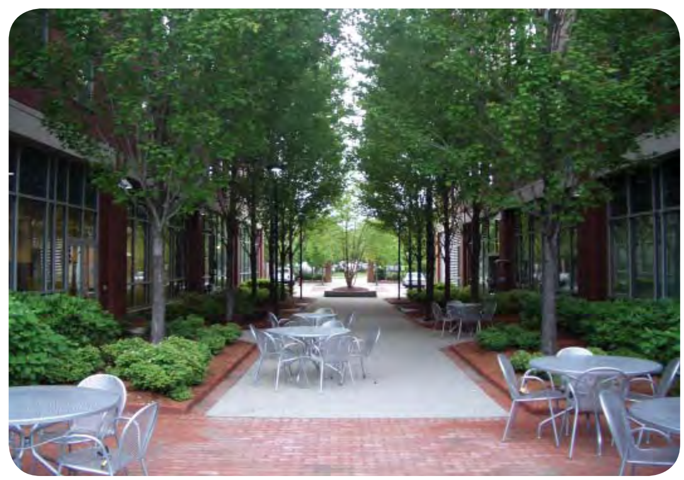
4.2.7.1 INTRODUCTION

The purpose of these guidelines is to provide more specific built form and siting requirements for the North of Shellard Neighbourhood, which build upon the Urban Design Guidelines for the West of Conklin Secondary Plan. Two primary gateways have been identified in the community: 1) Village Centre Gateway and 2) Institutional Gateway. Although the existing Secondary Plan guidelines provide criteria with respect to the private and public realm, more specific guidelines are required to address built form in the more fully realized gateways in the North of Shellard Lane Neighbourhood Plan.

The following guidelines will concentrate on the built form guidelines and siting with respect to the Village Centre mixed use, live work townhouses and retail/commercial block and the Place of Worship and School/Recreation Centre in the Institutional Gateway area. These guidelines should be read together with the West of Conklin Secondary Plan and in particular sections 4.5 and 4.7 of the Urban Design Guidelines

4.2.7.2 VILLAGE CENTRE GUIDELINES

The Village Centre is envisioned as a focal point for the North of Shellard Lane Neighbourhood and the entire West of Conklin Secondary Plan Area. It will include a variety of built forms and land uses (Single Detached Residential, Street Townhouses, Live/Work Townhouses, Low Rise Apartment, Mixed-Use and Retail/Commercial) that will create a pedestrian friendly destination area accessible to visitors and local residents.



1.0 Village Centre General Guidelines

- The buildings located at the gateway corner adjacent to Shellard Lane should have enhanced architectural features that address both streets and create and entrance into the Village Centre;
- The size, scale and design of the built form shall create an intimate, pedestrian friendly space and be complementary to the adjacent, primarily residential neighbourhoods;
- Single detached buildings shall be generally 1-2 storeys in height while the rest of the buildings shall be generally 3-4 storeys in height. Depending on the built form type, Mixed Use Apartments can be up to a maximum of 8 storeys.
- On street parking shall be provided and any off street parking shall be located at the rear or side of buildings, or in structure below grade, and include landscaping to buffer parking areas from pedestrian areas; and,
- Hard surface landscape treatments should be provided between the street edge and the building along with street furniture and soft landscaping to create a comfortable pedestrian experience.

2.0 Village Centre Guidelines

2.1 Single Detached Residential

- Buildings adjacent to Shellard Lane and facing onto the collector road shall be a minimum of 2 storeys in height to provide an appropriate built form edge on these two important streets;
- Buildings facing or flanking onto parks, open space and environmental areas are encouraged to address such

features though the incorporation of porches, windows and balconies in the building design;

- The single detached residential units sharing lane access with the live-work townhouses should be 2 storeys in height for appropriate transition in height and massing. Units with a 1½ storey may also be considered where the roof style provides appropriate massing; and,
- Buildings surrounding the parkette (fronting and flanking) should be mainly composed of models that include usable full porches to in order to facilitate passive security ("eyes on the park") and community interaction. Units flanking onto the park should incorporate a side or wraparound porch detail. Where this is not possible wall bump out and bay windows along with extensive fenestration should be provided.

2.2 Street Townhouses

- Buildings facing the Mixed Use Apartment blocks shall be a minimum of 2 storeys to provide an appropriate massing transition to the adjacent single detached residential units.

2.3 Live-Work Townhouses

- Buildings should be a minimum 3 storeys in height to reinforce the collector road street edge and provide an appropriate transition from the apartment block;
- Live-Work townhouses shall have rear elevations that are consistent with the materials, details, window styles/ types and window surrounds of the front elevation, to address views from the lane and the apartment block;

- Building elevations facing or flanking the parkette, open space and stormwater ponds should include enhanced architectural detailing including wall articulation, wall bump outs, bay and box out windows, useable porches, dormers and roof gable details; and,
- Buildings overlooking open space and stormwater pond features, are encouraged to include second storey balconies providing added built form "framing" of these features while also providing passive security through "eyes on the street".

2.4 Low Rise Apartment

- Low-rise apartments are encouraged to have a minimum height of 4 storeys;
- The location of the apartment block, mostly surrounded by environmental protection areas and a parkettes, will require that elevations addressing these features have consistent architectural treatment, detailing, window styles and cladding materials; and,
- Where possible, the apartment block massing should transition to the height of the live-work townhouses to the south.

Parking & Servicing

- Building parking areas/entrances and service areas will only be accessed from the lane way provided along the south edge of the block;
- Parking and service areas shall not be permitted between the building frontage and the street or the north edge of the block adjacent to the environmental protection area trail; and,
- Surface parking adjacent to the lane should include a minimum 3.0m landscaped edge to

partially screen extensive parking areas and provide a transition to the rear of the live-work townhouses.

2.5 Mixed-Use Retail/Residential

- The mixed use apartment blocks frame the main road leading into the North of Shellard Lane Neighbourhood and through consistent building heights, set backs and massing, they can visually and functionally create a Village Centre;
- Buildings should be a minimum 3 storeys in height, with 4 storeys encouraged to reinforce the street edge;
- All mixed use building will have a consistent and cohesive level of architectural detail and design on all four elevations;

- The mixed use building at the entrance from Shellard Lane shall be located close to the corner and should include an articulated architectural feature that responds to this important corner and provides a built form entry feature at the Village Centre Gateway;
- Retail uses will be restricted to the 1st storey to encourage an animated streetscape and ground level building edge. Where buildings exceed 4 storeys in height, the City may permit retail at the second storey level subject to further review by city staff;
- Buildings facing onto the green link, to the open space system, shall provide clear glazing on the elevations facing this links. The elevations are further encouraged to include entries, wall articulation, and where possible, space to accommodate outdoor seating areas;
- Buildings adjacent to the Retail/Commercial Block should provide for massing that transitions to a possible lowered height of that block. Where the mixed use building height

exceeds that of the retail/ commercial block, fenestration and other architectural detailing consistent with the front façade will be required to address public views, especially from Shellard Lane;

- The mixed use buildings sharing the same street as the street and live-work townhouses shall step down to three storeys to provide a more appropriate massing transition and streetscape; and,
- The mixed use buildings facing onto the parkette and the stormwater pond, should incorporate balconies on these elevations to take advantage of view towards the open space, provide security through overlook and encourage connection between these features and the built form.

4.2.7.3 INSTITUTIONAL GUIDELINES

3.1 Single Detached Residential

- Buildings backing onto the Place of Worship block shall have rear elevations consistent with the front elevation in terms of cladding, window styles/types and detailing. In addition, it is encouraged that the rear elevations include a variety of architectural details and features including, but not limited to, gable variety, dormers, wall articulation and two storey bays; and
- The large single detached residential and single detached buildings flanking the EPA associated areas should be 2-storey units to help define the trail entry into the environmental protection area.

3.2 Street Townhouses

- Building units facing onto the Recreation Centre/ Sportsfield areas shall be a minimum of 2 storeys to provide a strong built form edge along the community collector road and an appropriate transition from the live-work townhouses in the Village Centre;
- Where possible units overlooking the recreation area should include enhanced architectural detailing including wall articulation, wall bump outs, bay and box out windows, useable porches, balconies, dormers and roof gable details; and,
- Street townhouses shall have rear elevations that are consistent with the materials, details, window styles/ types and window surrounds of the front elevation, to address views from the lane.

3.3 Place of Worship

- The Place of Worship block forms the western half of the institutional gateway into the community and thus will require that any proposed building be located as close to the corner to help define this entry and create a strong built form edge along Shellard Lane. The Place of Worship building will be a community landmark and should be designed as such;
- Building architecture should address both the collector road and Shellard lane through fenestration and wall articulation. Particular emphasis should articulation at the gateway to address the corner (e.g. tower features, large bump outs and pediment gables, extensive fenestration/clear glazing, etc.);
- Soft and hard landscaped features should be provided at the corner and be coordinated with the design of the building, to provide another layer of entry into the community; and,
- Outdoor gathering spaces and/or pickup/drop-off areas should provide weather protection that are either incorporated into or be in keeping with the building design.

Parking & Servicing

- Parking and service areas will be located to the side and shall not be permitted between the building and the corner;
- Large parking areas should be divided into smaller courtyards of parking and include landscaped parking islands that could also serve as part of pedestrian circulation within the parking areas;

- The pedestrian circulation should be defined by special paving or markings denoting connections and crossings leading to the building;
- Pickup and drop-off areas should avoid interference with pedestrian walkway areas;
- A minimum 3.0m landscaped edge should be provided adjacent to residential areas, internal roads, the collector road and Shellard lane to help screen parking areas but not to completely obstruct views into the parking area; and,
- Pedestrian connections/walkways between the adjacent residential areas and the building be provided to promote non-vehicular access to the Place of Worship.

3.4 Institutional Centre

- The Recreation Centre, Secondary School and Library could be designed as one complex to compliment each other;
- The Recreation Centre, Library and Secondary School complex forms the eastern half of the institutional gateway into the community and thus will require that the School building be located close to the corner to help define this entry and create a strong built form edge along the collector road and Shellard Lane;
- The complex will also serve as a community landmark and where possible the cladding materials, colours, roof detailing, window styles and design should be coordinated to provide a consistent and integrated appearance. A colour variation may be considered to distinguish the school function and gateway from the community recreation facilities;

- Building architecture should address both the collector road and Shellard Lane through fenestration and wall articulation;
- Soft and hard landscaped features should be provided at the corner and in between buildings in a series of active or passive courtyards be coordinated amongst buildings;
- Accessory buildings such as field houses and picnic shelters shall have a design and material palette consistent with that of the main buildings;
- Access to Library's exterior wall of the internal road is needed for book drop functions;
- Access to Library facility needs to be accessible and close to parking but away from designated areas for school bus pick-up and drop off areas;
- All Institutional Centre buildings should be located close to the Shellard Lane street edge and where appropriate should provide pedestrian access from Shellard Lane. A school bus pickup/drop-off only area along Shellard Lane is strongly encouraged; and,
- Outdoor gathering spaces, connections/walkways between buildings and pickup/drop-off areas should include weather protection that is either incorporated into, or be in keeping with, the building design; and,
- All Institutional buildings should achieve a minimum LEED Silver Certification with special regards for storm water management initiatives. As such, green roofs and permeable exterior surfaces are highly encouraged.

Parking & Servicing

- Parking areas will be located to the side and/or rear of the Institutional buildings and shall not be permitted between the buildings and either the collector road or the Shellard Lane edge;
- The parking areas will be large to accommodate

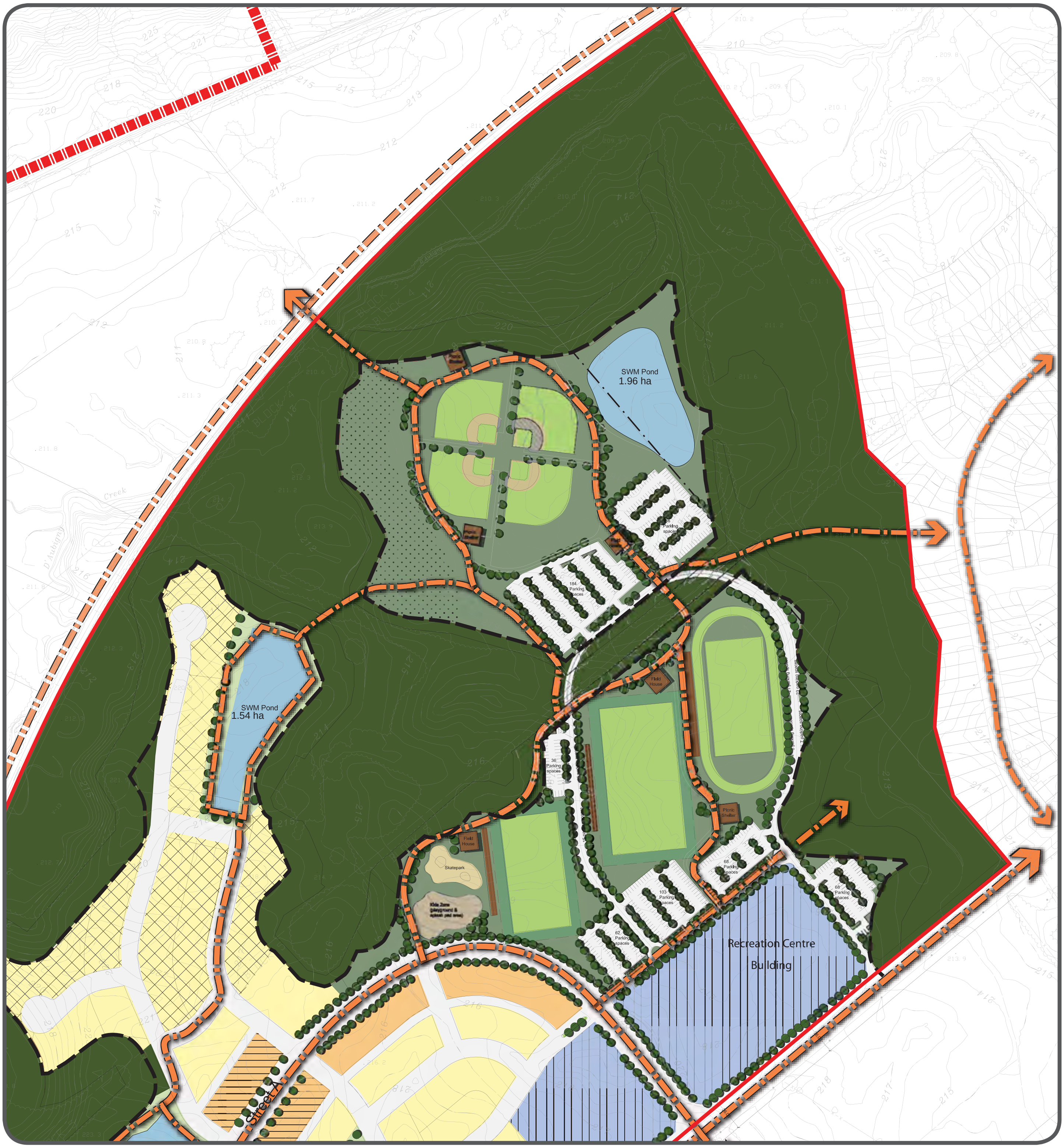
facility use and therefore should be divided into smaller courtyards of parking that include landscaped parking islands;

- Pedestrian walkways should be well defined, through decorative paving and wherever possible, be incorporated into the landscaped islands to address pedestrian circulation between parking areas and buildings;
- Pickup and drop-off areas should avoid interference with pedestrian walkway areas;
- Locate short- and long-term bicycle parking in highly visible, well-lit, accessible and weather protected areas. Incorporate wayfinding signage as appropriate;
- Retain and protect existing trees, vegetation, natural slopes and native soils and integrate these features into the overall landscape plan;
- Distribute landscaping throughout the site to soften and screen parking lot edges, reinforce circulation routes, create pleasant pedestrian conditions and maximize shade and stormwater benefits.;
- Expand rooting zones of landscaped areas under adjacent hard surfaces;
- Install a permanent irrigation system in all landscaped areas. Where possible, collect rainwater from rooftops and other surfaces for plant irrigation;
- Servicing areas will be discretely located to minimize exposure to views and should both be located in view of approaches from street edges and should be adequately screened to address views from the main parking areas closest to the collector Road;

- Provide a comprehensive Lighting Plan for the parking lot site. Lighting should create an identity for the parking lot, enhance adjacent streets and pedestrian environments and be appropriate to the location, context and scale of the areas being lit.;
- Balance the need for safety and security with the reduction of energy consumption and light pollution by ensuring all parking spaces and circulation routes are well-lit, avoid "over lighting", direct light downward and avoid light overspill on adjacent properties, streets and open spaces, use energy-efficient fixtures and bulbs, incorporate opportunities for off-grid power generation, e.g. solar, wind, etc.;
- Minimize the extent of impermeable surfaces within the parking lot;
- Manage rainwater and snowmelt on-site with designs that encourage infiltration, evapotranspiration and water re-use;
- Where installed, bio-retention areas should be appropriately designed and located to filter, store and/or convey the expected stormwater flows from surrounding paved areas; and,
- Where installed, bio-retention areas should be appropriately designed and located to filter, store and/or convey the expected stormwater flows from surrounding paved areas.

Part 5
THE SPORTS CAMPUS

Figure 33. Conceptual Sports Campus Master Plan.



5.1 Design Overview

The Shellard Lane Sports Campus plan is based on the following guiding design principles:

1. Work with existing topography and landscape to the fullest extent possible to minimize changes to the site's topography and drainage patterns;
2. Orient play fields based on optimal solar orientation to maximize play value;
3. Provide programming and facilities to cater to both the local Shellard Lane neighbourhood and greater Brantford community including opportunities for leagues and tournaments; and,
4. Sensitively integrate with the surrounding residential community.

Topography and Storm Water Management

The layout of facilities assumes the site will be tiered to help match the pre development drainage patterns and minimize cutting or filling on the site. The site's storm water management approach consists of a series of landscaped swales, perforated drain tiles below play fields, permeable pavement systems and rainwater collection cisterns. Together these will minimize overland flow and maximize infiltration at the source. Captured storm water will be used for irrigation on the sports fields.

Play Field Orientation

Soccer and football fields are oriented north to south to minimize occurrences when players will need to run towards the sun when it is low on the horizon. This will maximize use and quality of the fields. The north south orientation also works well with the site's topography

Programming and Facilities

The surrounding community needs requires that facilities be provided which cater to a wide range of users in regards to age, skill and mobility. This includes providing facilities for the growing seniors population that will undoubtedly reside in the community. Beyond Seniors programming which would be provided as part of the library and recreation centre, some specific consideration for seniors in the Sports Campus include:

1. Accessible pathways where possible and in key areas;
2. Grading of the site to provide alternatives to stairs;
3. Seating, both at regular intervals along trails and where there is potential interest in being a spectator in the park; and,
4. Where appropriate, proper lighting and signage for way finding.

Neighbourhood related park facilities include:

1. Recreation Centre Facility Building;
2. Children's play grounds;
3. Splash pad;
4. Skate park;
5. Soccer field;
6. Softball Diamond; and,
7. Trail System.

City Wide facilities include:

1. Baseball diamonds with back to back configuration for tournament play;
2. Football field with artificial turf;
3. Soccer field with running track; and,
4. Field Houses.

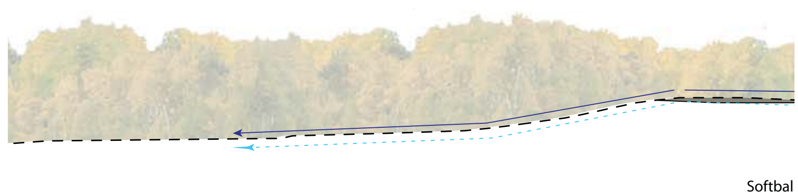
Final Recreation Centre and sports fields configuration and layout will be determined at the site plan stage.

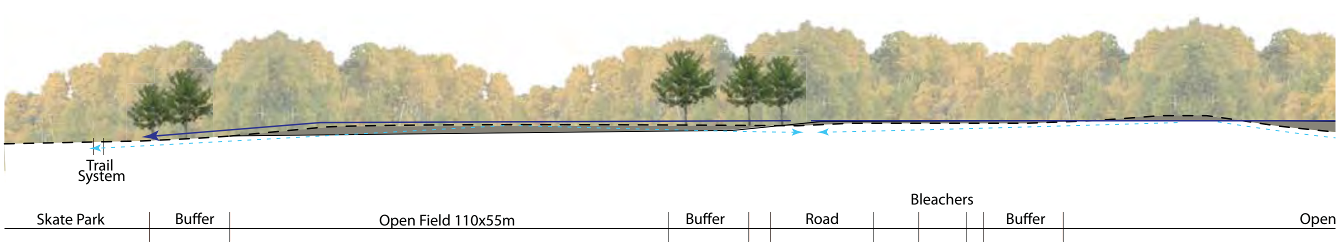
Figure 34. Cross Section Key Map

Community Integration

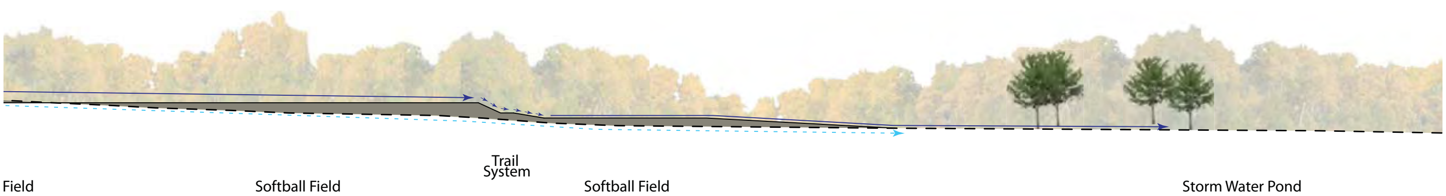
The park and facilities have been carefully planned to integrate with the surrounding community. This includes:

1. Main entrance road located to align with the community road network;
2. Secondary access provided directly off of Shellard Lane to create loop road system;
3. Links to the Brantford trail system; and,

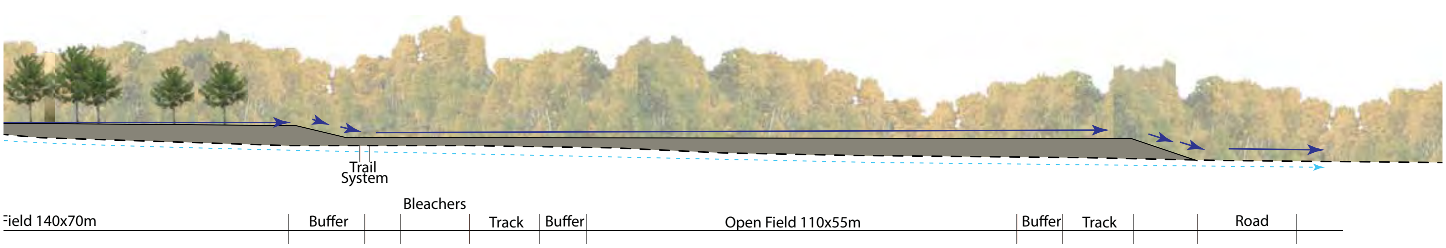




4. Neighbourhood park facilities including the playground, skate park, water play and soccer field are located closest to the community while the facilities which should attract larger groups for tournament and league play and located further into the park.



Section A-A



Section B-B

Figure 35. Proposed Facilities Plan

5.2 Sports Campus Facilities

The park consists of the following facilities:

1. A Recreation Centre
2. 3 Play Fields;
3. 4 Softball Diamonds;
4. Skate Park;
5. Children's Playground;
6. Splash Pad;
7. Field Houses
8. Picnic Shelters
9. Trail System; and,
10. Parking.

Recreation Centre

The North of Shellard Recreation Centre will provide for the diverse recreational needs of the growing City of Brantford community. This facility will fill in the gap of the City's southwest recreational needs while being located in one of the last large City owned parcels of land.

Based on this study consultation process of organized sports groups and local community interviews as well as public workshops a preliminary facilities program was identified (Refer to Section 3: Design Workshop). The facility program informed the design exercise providing for the dimensional/ spacial needs of all identified sports, learning and community activities.

While the large indoor sports facilities listed next could be accommodated in the proposed school double gym facility, the following list presents all of the community's sports, recreational and social space requirements that need to be considered in the final design stage:

1. Badminton Courts;
2. multi-purpose field (football, soccer, etc);
3. weight space;
4. futsol court;
5. double Gym;
6. skating rink;
7. fitness Space (aerobics, yoga, spinning, etc);
8. volleyball courts;
9. running tracks;
10. office space;
11. storage space;
12. meeting space;
13. classroom space;
14. change rooms;
15. retail and food facilities (pro-shop, restaurant, snack bar, coffee pub);
16. daycare;
17. Youth-St. Lawrence facilities;
18. art space (dance, music, painting);
19. social services;
20. sport's medicine services;
21. police satellite office;
22. curling club;
23. public restrooms

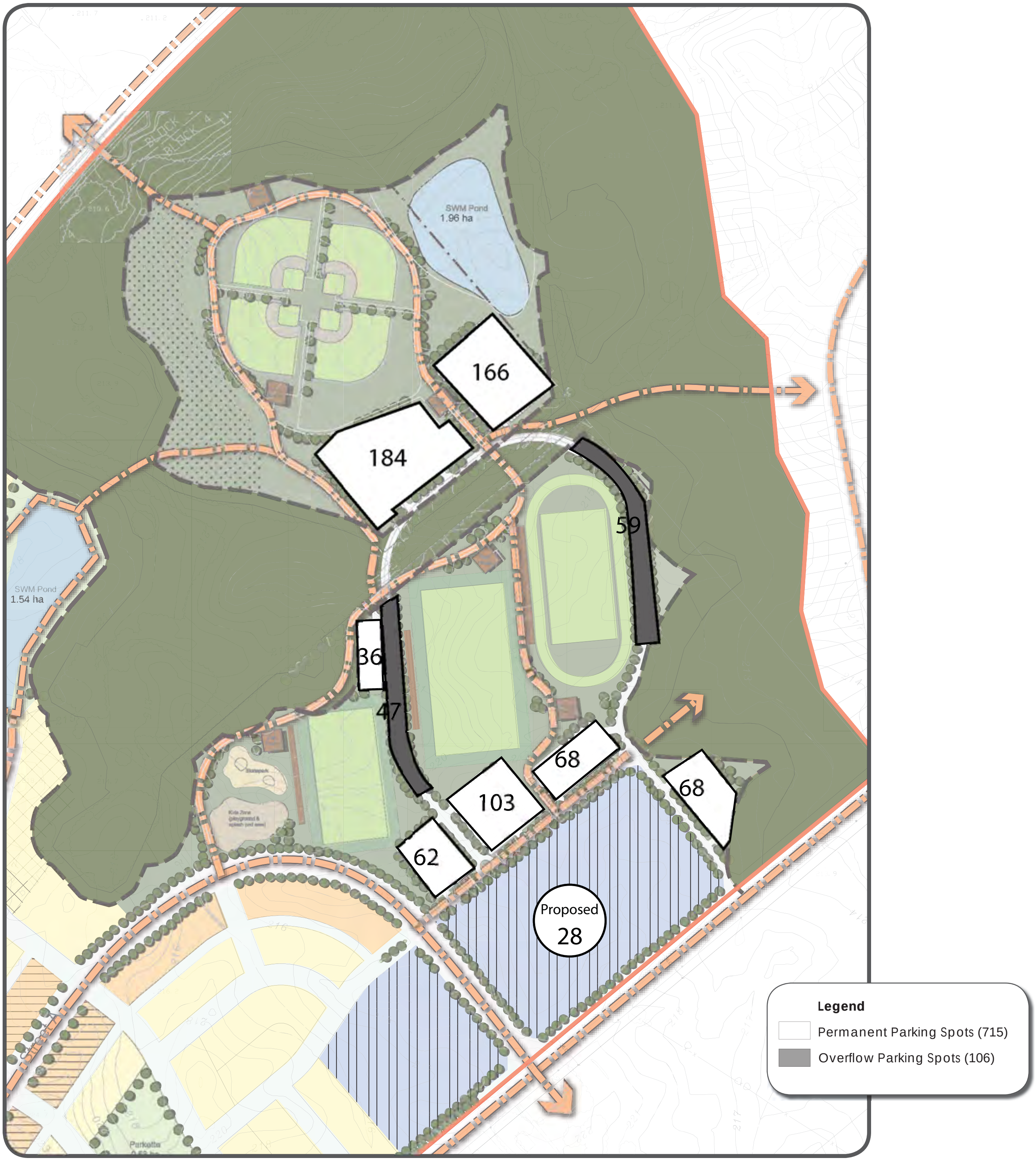
An initial 23,500 sq ft (2,200 sq.mt.) facility was assumed to accommodate for all of the recreational and social community needs complimented by a 36,000 sq.ft. (3,344 sq.mt.) double gym facility to be shared with the proposed school.

Play Fields

Three play fields are proposed, each oriented in a north south direction. This includes:

1. One soccer field 100 x 55 metres;
2. One Football and Rugby artificial turf field 140 x 70 metres; and,
3. One Field 100 x 55 metres with a 400 metre running track.

Figure 36. Proposed Parking Plan



Each field includes spectator seating, lighting, irrigation and is sub drained to improve field drainage and turf quality. The largest of the three fields is centrally located and positioned to permit doming in the future during the winter months. This would allow all season play and practice in the off-season during the winter months.

Ball Diamonds

At the north end of the site a softball diamond complex is proposed. Four diamonds in a back-to-back configuration are proposed so that the diamond back-stops are consolidated at the centre.

Each field includes spectator seating for 250 people and includes lighting, irrigation and is sub drained to improve field drainage and turf quality. An enclosed team dug-out, players bench, warning track and home run fence should also be provided for each diamond.

Skate Park

At the west corner of the site a stake park is proposed which would be suitable for use by a wide range of users including skateboarders, BMX riders, mountain bikers and inline skaters. The facility consists of a concrete pad with skate features provided.

Adequate seating and lighting needs to be included with this facility.

Children's Playground

Located in the west side of the site, the playground should be designed to address the skills, ages and interests of a wide range of children and meet accessibility guidelines. The playground should be conveniently located in close proximity to washroom facilities and a drinking fountain. Shade and seating are also important considerations in the design.

Splash Pad

Next to the playground a splash pad / water play facility is proposed for community use. The splash pad would consist primarily of in ground spray heads and spray nozzles with no standing water. Due to filtration / health requirements and the costs and complexities of the system required using cistern water is not recommended for the water play.

Field Houses

Two field houses are proposed. One to service the south half of the park in the area of the play fields, the other at the north end for the ball diamonds. The field houses will serve a number of functions including:

1. Washroom Facilities;
2. Change Facilities;
3. Concession Stand; and,
4. Equipment Storage.

Picnic Shelters

Two picnic shelters are proposed. One in the south and two in the north. These structures will provide a sheltered location in the park for groups to gather with picnic tables and access to water. Additional picnic shelters should be explored at the final site plan stage if required.

Trail System

The park's trails system should connect all of the various park amenities and sports facilities to one another, as well as connect the recreation centre to the Brantford trail network and the surrounding community. The pathways should be 3 metres in width, asphalt, and signed to provide users with clear directions to the various park facilities.

Parking

The strategy for parking is to provide adequate capacity during regular use periods and to use designated temporary over flow parking locations during peak periods such as tournaments. Off-site parking, including parking throughout the community on local roads, and encouraging the community to walk or bike rather than drive will also help to reduce demand.

Designated Parking

Designated parking is provided throughout the park to provide all season parking. 715 (seven hundred and fifteen) parking stalls are provided in eight parking lots of varying size. Another 106 (hundred and six) spots are available as parallel parking spaces along the park internal road system. The lots are designed to provide a safe, easily accessible parking option for park users by grouping stalls into smaller lots, orienting parking stalls perpendicular to buildings and facilities and being well lit. These lots are also designed to help manage storm water on site through the use of permeable paving, planted storm water infiltration islands, and with adequate soil volumes to support large shade trees to reduce the urban heat island effect.

Overflow Parking

Overflow parking areas are simply grassed areas most of the time. However, during tournaments or other busy periods, these designated areas are used for parking. These areas are located on the shoulder of the park roads.

Bike Parking

To help minimize parking demand from the Shellard neighbourhood, the plan provides good connections to the community's trail network and a range of bicycle parking options. This includes safe and visible bicycle parking at each park destination.

Parking numbers

Anticipated parking demand generated by the proposed institutional buildings and sport fields has been calculated as follows:

1. Institutional Land Use space requirements were defined and confirmed (total sq ft) (Table 6);
2. Sports fields user requirements were identified (based on the number of players required to play a specific sport and the number of potential spectators) (Table 7);
3. Standard Parking requirements were identified for each one of the land uses;
4. Occupancy rates were identified for each land use during week days and weekend hours of operation;
5. Three occupancy scenarios were developed to test the parking needs for the entire complex based on the above described strategy (Table 8); and,
6. The largest sum of the analyzed scenarios was identified as the minimum number of required parking spaces for the Recreation Centre Master Plan.

While parking demand created by institutional uses such as libraries, schools and recreation complexes are easily quantified based on square footage and use, determining the demand sports fields will generate is less evident. To help determine demand, the following assumptions have been made:

1. One (1) car per player
2. Provide sufficient parking for transition periods

(overlap period after one game ends and another begins) - therefore double the 1 car per player rule.

3. Parking for spectators and support staff (additional +/- 20% of players).

Based on these assumptions a total of 821 parking spaces are estimated to be required at any given time during regular hours of operation.

The discrepancy between demand and availability will need to be managed in a collaborative manner between user groups and City staff to coordinate daily play and tournament times. For example, by not permitting the gymnasium, ball fields and play fields for tournaments on the same weekend or by scheduling tournament and play times with in between transition times.

Table 6. Building space requirements

Use	Area	Sq Ft	m^2	1_{st} floor m^2	2_{nd} floor m^2
High School					
	Cafeteria	8,000.00	743.22	743.22	
	Gymnasium	0.00	0.00	0.00	
	Library	0.00	0.00	0.00	
	Administration	15,000.00	1,393.55	1,393.55	
	Classrooms	52,000.00	4,830.96	2415.478	2,415.48
	Circulation (36.7%)	27,525.00	2,557.16	1,670.67	886.48
High School Total		102,525.00	9,524.88	6,222.92	3,301.96
Library		18,000.00	1,672.25	836.127	836.127
Rec Centre		23,500.00	2,183.22	2,183.22	
Double Gym		36,000.00	3,344.51	3,344.51	

Table 7. Sports fields users requirements

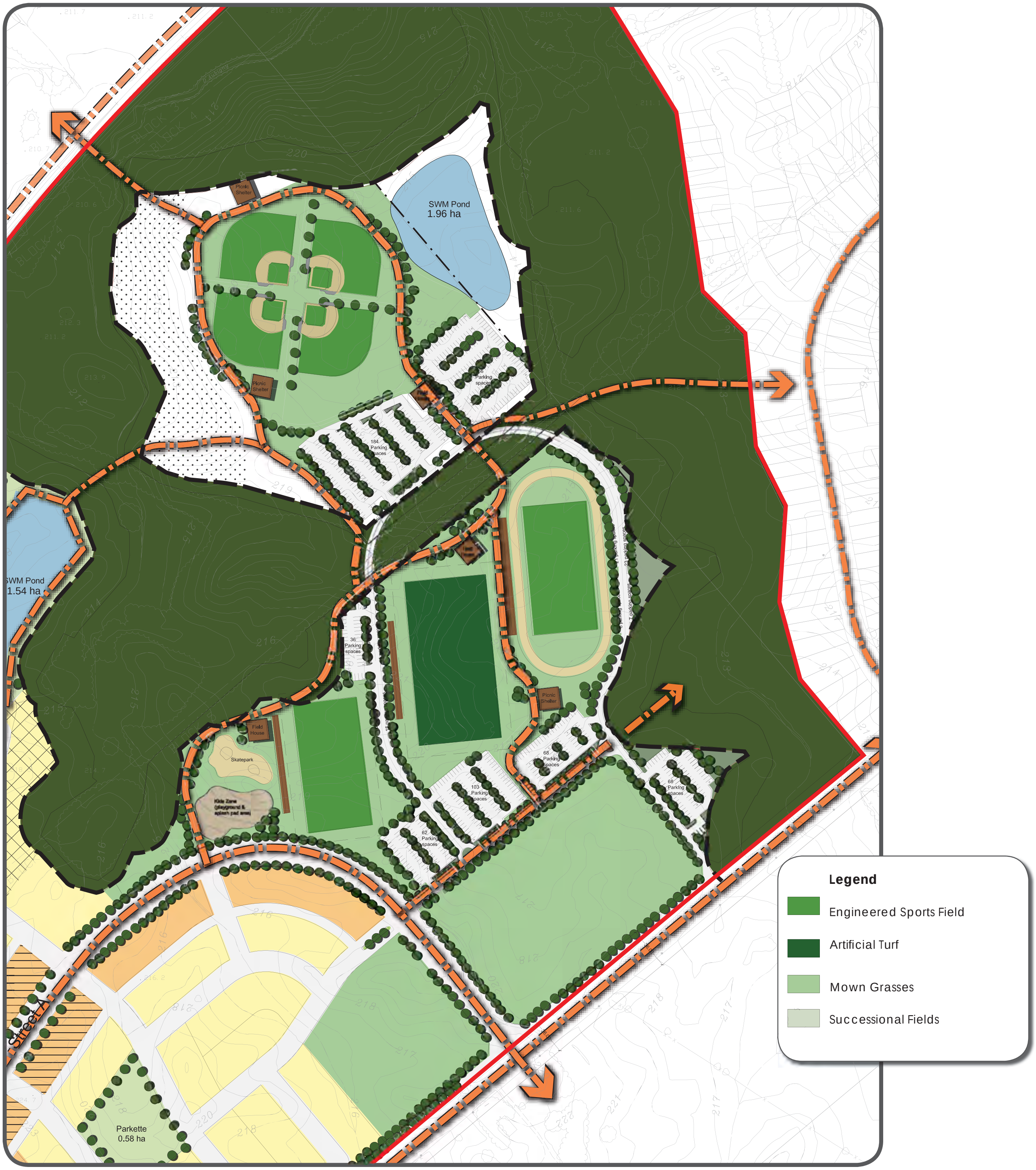
Use	1 stall/player	1 stall/player transition period	20% of players for support staff and spectators	Number of Sport fields	Total Parking Spaces
Ball diamonds	38	38	8	4	334
Soccer	22	11	4	2	75
Football/Rugby (practice)	55	28	11	1	94
Football (tournaments)	110 players (2 buses/tournament + 2 during transition times)		22	1	22

Proposed Parking Strategy				Scenario 1 8:00am to 4:00pm (Monday to Friday)		Scenario 2 4:00pm to 11:00pm (Monday to Friday)		Scenario 3 Weekends		Provided Parking Spaces
Use	*Parking Standard (space/gross floor area)*	*Required Parking Spaces*	*Main Traffic Generating Hours*	*occupancy rate (%)*	*parking spaces assumed to be required*	*occupancy rate (%)*	*parking spaces assumed to be required*	*occupancy rate (%)*	*parking spaces assumed to be required*	
High School *	1 space/20m^{2***}	476	8:00am-4:00pm	100%	476	0%	0	0%	0	
Double Gymnasium **	1 space/20m^{2***}	167	4:00pm-11:00pm	100%	167	100%	167	100%	167	
Library **	1 space/30m^{2***}	56	4:00pm-9:00pm	100%	56	50%	28	50%	28	
Recreation Centre	1 space/20m^{2***}	109	4:00am-11:00pm	50%	55	100%	109	100%	109	
Accessible parking	2% of total institutional parking	16	8:00am-11:00pm	100%	16	100%	16	100%	16	
Ball diamonds		334	4:00pm-11:00pm	10%	33	100%	334	100%	334	
Soccer		75	4:00pm-11:00pm	10%	7	100%	75	100%	75	
Football/Rugby (practice)		94	4:00pm-11:00pm	10%	9	100%	94	0%	0	
Football (tournaments)		22	all day weekends	10%	2	0%	0	100%	22	+ parking space for 4 coach sized buses
TOTAL		**1,349**			**822**		**823**		**752**	**821**

** High School area excludes gymnasium and library areas*
*** Assumes gym and library are for high school and public use*
**** City of Brantford Parking By-law*

Table 8. Parking requirements

Figure 37. Proposed Maintenance Plan

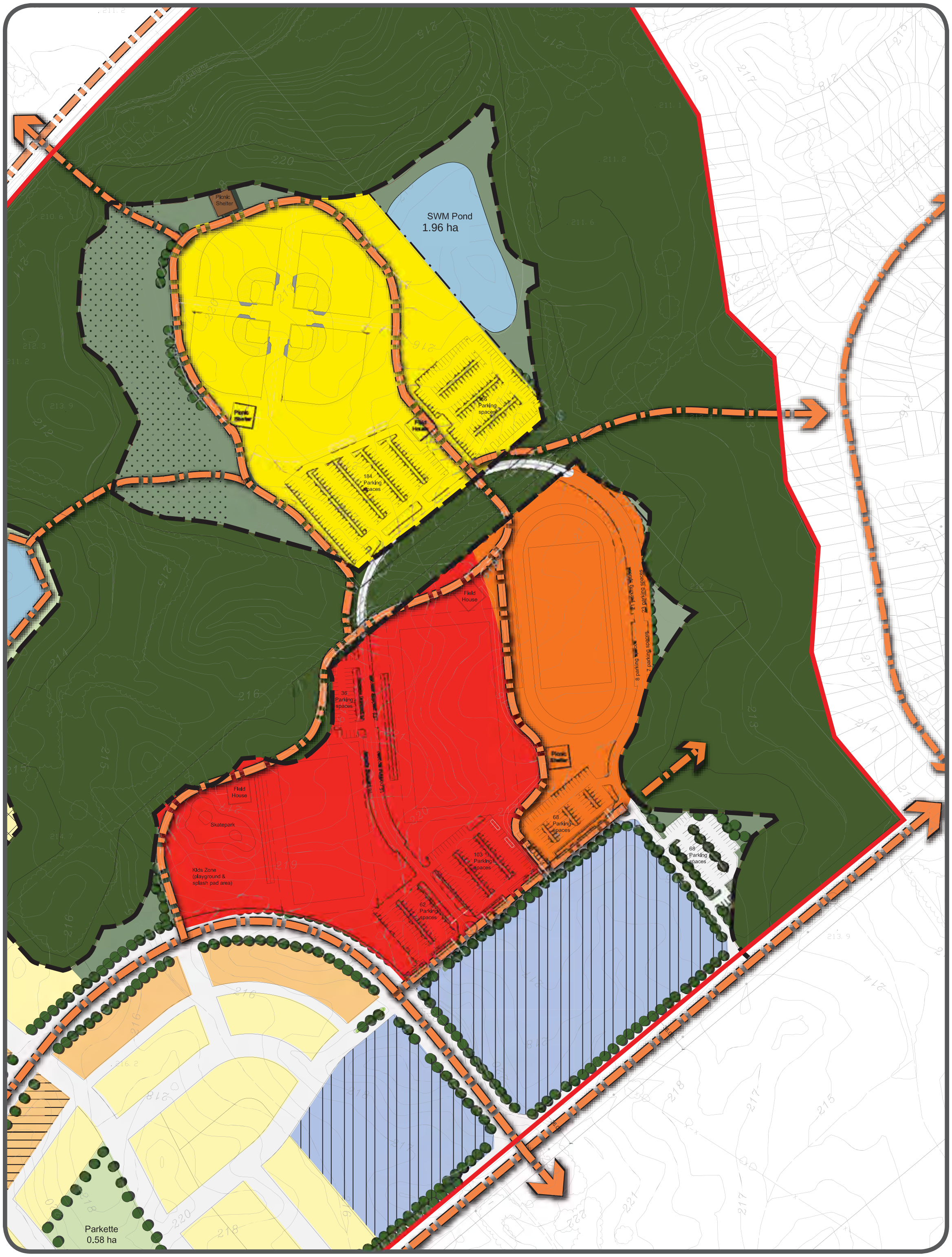


Landscaping Maintenance

The approach to landscaping is to simplify the maintenance regime with the ultimate goal of reducing maintenance times and disruptions resulting in a continuous and uninterrupted usage of the facilities throughout the year.

Planting should consist of drought tolerant, hardy native species to further reduce maintenance. Refer to section 5.5 Sports Campus Design Guidelines, Planting section for information on specific species for the site's different landscape units.

Figure 38. Proposed Phasing Zones



5.3 Phasing Plan

The proposed phasing plan is focused on outlining a logical sequence of implementation across the site while dividing the work into manageable projects in regards to scope and budget. There are numerous possible work sequences which could be employed and any number of phasing approaches which could be followed depending on when funding becomes available or as priority needs are identified.
Final site plan approval stage supporting studies in conjunction with the identified priority needs may result in a different sports filed layout and distribution.

The following phasing groupings have bee identified:

Red Zone
The initial phase of work could focus on the sport field facilities located at the south west corner of the recreational complex site. This includes construction of the access roads into the site, the library, double Gym, and even the school should demand require. In association with these facilities parking lots should also be constructed.

One or two of the fields should also be constructed early on to support the needs of the Brantford sporting community as well as local residents. The play field and running track could be constructed within this phase if the school is built at the same time.

Orange Zone
The next phase of work should concentrate on completing the park road network for the south portion of the site including the secondary site access connection at Shellard Lane. The third play field should be constructed, along with the running track.

Yellow Zone
Located at the north side of the site, this phase of work includes additional parking, a ball diamond complex, a field house, a picnic shelter. Standard soft ball field dimensions in conjunction with known grading and slope conditions of norther portion of the site made this area the preferred location for this fields. Current community needs identified these facilities as top priority requiring the future site plan process to assess the possibility of constructing these facilities first.

As previously stated, the phasing zones could be built in a completely different order. For example, the Yellow Zone could be the initial phase given the City's softball needs identified thorough this study.

5.4 Budget

Tables 9 and 10 present a high level estimate of the costs associated with each element in the park. Although the approximate cost for recreation centres varies quite widely due to scope, amenities and quality, a tentative Construction Cost for the Recreation Centre building was estimated at a range of 170 to 255 per sq.ft. (with the higher range being considered for LEED construction) for a total of four to six million dollars. Construction Cost does not represent Total Project Cost which often represents an additional cost of 20% (or a higher percent depending on the selected/required furnishings, equipment, fixtures, etc.) above Construction Cost.

A complete cost analysis needs to be conducted at the site design stage which will further confirm final Total Project Costs for all institutional buildings and park facilities.

Table 9. Preliminary Cost Estimate Summary

1	**Recreation Centre Facility** (Construction Cost Only)	**$**			**6,000,000.00**
2	**Site Preparation**				
	Site Preparation North Portion	$			728,206.00
	Site Preparation South Portion	$			1,101,934.00
	Total	**$**			**1,830,140.00**
3	**Play Fields (Football, Soccer and Rugby)**				
	Field #1: 400m Asphalt Track & Field (110 x 55)	$			1,165,000.00
	Field #2: Football and Rugby Field (140 x 70)	$			1,132,000.00
	Field #3: Soccer Field (110 x 55)	$			390,000.00
	Total	**$**			**2,687,000.00**
4	**Softball Fields**				
	Softball Field #1	$			375,000.00
	Softball Field #2	$			375,000.00
	Softball Field #3	$			375,000.00
	Softball Field #4	$			375,000.00
	Total	**$**			**1,500,000.00**
5	**Skate park**				
	Skate park	$			332,800.00
	Total	**$**			**332,800.00**
6	**Community Playground**				
	Junior Playground	$			253,500.00
	Tot Lot Playground	$			153,200.00
	Splash Pad	$			338,210.00
	Total	**$**			**744,910.00**
7	**Field Houses**				
	North Field House	$			750,000.00
	Two South Field Houses	$			1,500,000.00
	Total	**$**			**2,250,000.00**
8	**Picnic Shelters**				
	North Picnic Shelter 1	$			168,905.00
	North Picnic Shelter 2	$			168,905.00
	South Picnic Shelter	$			168,905.00
	Total	**$**			**506,715.00**
9	**Trail Head**				
	Trail Head #1	$			13,500.00
	Trail Head #2	$			13,500.00
	Trail Head #3	$			13,500.00
	Total	**$**			**40,500.00**
10	**Parking**				
	North Parking Lots	$			1,775,260.00
	South Parking Lots	$			1,567,605.00
	West Entrance Road	$			337,440.00
	South Entrance Road	$			368,810.00
	East Connector Road	$			632,400.00
	North Connector Road	$			492,990.00
	Connector Road to North and East Road	$			165,180.00
	Total	**$**			**5,339,685.00**
11	**Landscaping**				
	North Fields	$			864,038.00
	South Fields	$			690,722.00
	School / Community Centre / Library	$			1,990,400.00
	Total	**$**			**3,545,160.00**
	Sub Total	**$**			**24,776,910.00**
	Consulting Design Fee (8%)		8%	$	1,982,152.80
	Contingency		15%	$	3,716,536.50
	HST		13%	$	3,220,998.30
	Total Cost	**$**			**33,696,597.60**

Table 10. Phased Cost Estimate

Phased Estimate

Phase 1: Recreation Centre

Recreation Centre Facility	$	6,000,000.00
Site Preparation	$	661,160.40
Field #2 (Middle Field)	$	1,132,000.00
Field #3 (West Field)	$	390,000.00
Skate park	$	332,800.00
Community Playground	$	744,910.00
South Field House 1	$	750,000.00
South Picnic Shelter	$	168,905.00
Trail Head	$	13,500.00
South Parking Lot	$	940,563.00
West Entrance Road	$	337,440.00
North Connector Road	$	492,990.00
Landscaping	$	1,608,673.20
Sub Total	$	13,572,941.60
Consulting Design Fee (8%)	$	1,085,835.33
Contingency (15%)	$	2,035,941.24
HST (13%)	$	1,764,482.41
Total Phase 1	**$**	**18,459,200.58**

Phase 2: Stadium and Connector Roads

Site Preparation	$	440,773.60
Field #1 (East Field)	$	1,165,000.00
South Field House	$	750,000.00
Trail Head	$	13,500.00
South Entrance Road	$	368,810.00
East Connector Road	$	632,400.00
South Parking Lot	$	627,042.00
Landscaping	$	1,072,448.80
Sub Total	$	5,069,974.40
Consulting Design Fee (8%)	$	405,597.95
Contingency (15%)	$	760,496.16
HST (13%)	$	659,096.67
Total Phase 2	**$**	**6,895,165.18**

Phase 3: North Softball and Parking

Site Preparation	$	728,206.00
Softball Fields	$	1,500,000.00
Field House	$	750,000.00
Picnic Shelter #1	$	168,905.00
Picnic Shelter #2	$	168,905.00
Trail Head	$	13,500.00
North Parking Lot	$	1,775,260.00
Connector Road to North and East Road	$	165,180.00
Landscaping	$	864,038.00
Sub Total	$	6,133,994.00
Consulting Design Fee (8%)	$	490,719.52
Contingency (15%)	$	920,099.10
HST (13%)	$	797,419.22
Total Phase 3	**$**	**8,342,231.84**

Phase 1	$	18,459,200.58
Phase 2	$	6,895,165.18
Phase 3	$	8,342,231.84
Total all Phases	**$**	**33,696,597.60**

5.5 Sports Campus Design Guidelines

The following guidelines are provided for the North of Shellard Community Park and Recreation Centre.

Grading and Storm Water Management

- Grade site to minimize alteration of storm water flow and to mimic pre development flows to the fullest extent possible;
- Use cisterns and other temporary storm water detention facilities to control storm water flows during peak storm events;
- Terrace fields and parking areas to minimize cut and fill and to replicate pre development topography to the fullest extent possible; and,
- Do not alter grades within buffer areas.

Parking Areas

- Parking areas should be paved using a permeable unit paving system to help minimize storm water run-off;
- Divide larger parking areas both visually and functionally into smaller lots;
- Organize parking stalls to provide consolidated landscaping areas;
- Design landscaped islands to function as bio swales;
- Arrange parking rows perpendicular to the primary direction of pedestrian travel;
- Minimize potential pedestrian and vehicular conflicts by avoiding parking lot entrances at primary pedestrian crossing locations; and,
- Sodded overflow parking areas demarcated with roll

curbs will be located at both the north and south parking lots and be cleared in advance to scheduled large sports events as part of the overflow parking strategy.

Park Roads

- Sensitively integrate road to work with natural landform as much as possible to minimize cut and fill requirements;
- Provide street trees along all roads to help define road corridor and shade pavement;
- Create a loop roadway network to ensure multiple points of entrance and exit from the site;
- Provide roll curbs with a 3 metre permeable shoulder to facilitate road side parallel parking as part of the overflow parking strategy;
- Provide for a minimum of 7.5 metres clear right of way; and,
- Provide road lighting designed to fit into the landscape and adjacent sports field lighting requirement. Road lighting design should minimize its impact on the adjacent natural environment.

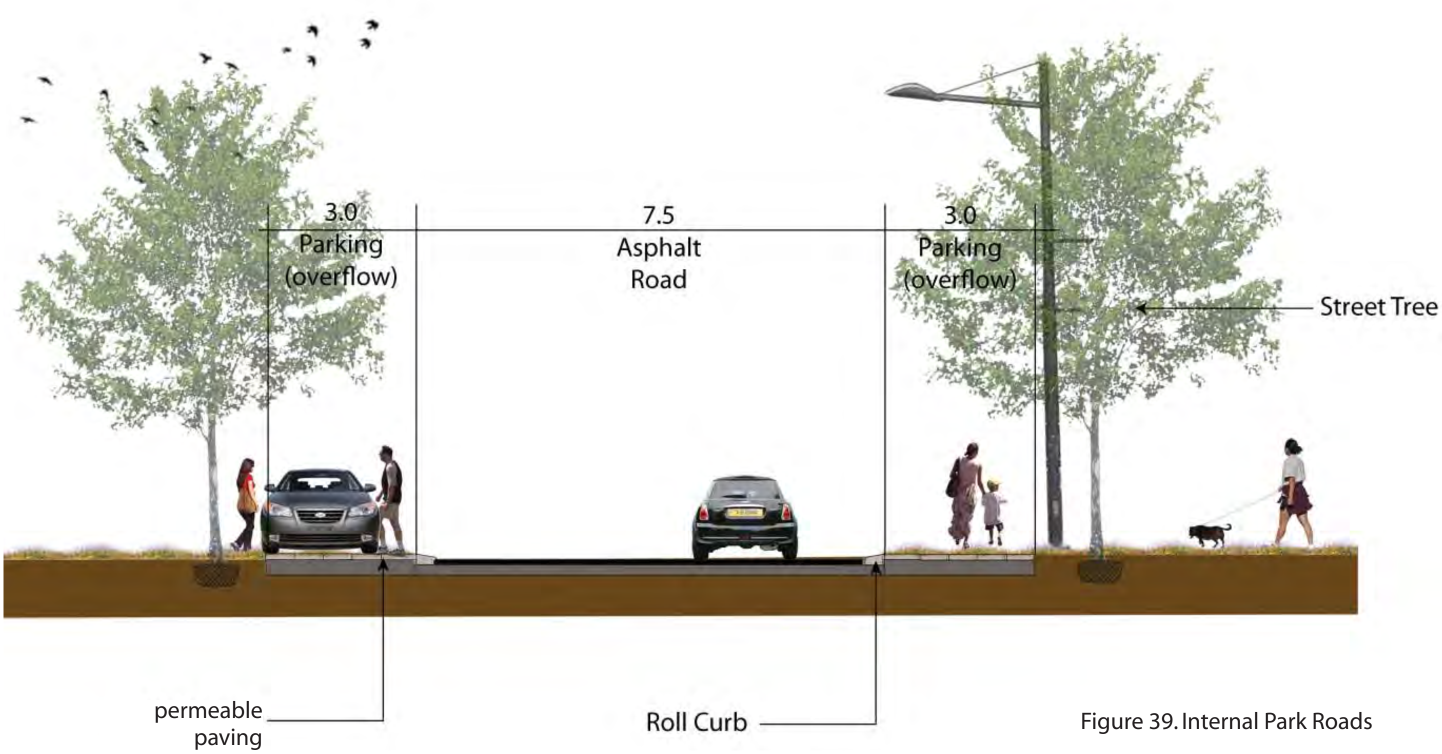


Figure 39. Internal Park Roads

Sports Fields

- Fields to be oriented for optimal relationship with the sun;
- Slope play fields so that no water drains onto it from the sidelines;
- Grade the infield of ball diamonds to be higher than the rest of the field;
- Slope natural grass fields at 1.25 percent to 1.75 percent;
- Slope ball diamond infields at 0.5%;
- Construct field on a sand / soil mix complete with a subdrainage system of perforated pipes to improve field drainage;
- Provide at least one artificial turf field;
- Provide lighting on timers to allow for use during early evening hours; and,
- An automatic irrigation system shall be installed and operated for all fields.

Skate Park

- Locate facility in highly visible location so it is easily accessible and can be monitored from the street;
- Skate park will be designed for multiple users including skateboarders, BMX riders, mountain bikers and inline skaters;
- Design facility to permit flooding in the winter, including a non-freeze hydrant to allow for ice skating to encourage all season use;
- Provide lighting on timers to allow for use during early evening hours and winter use for ice skating;
- Design facility to provide opportunities for and encourage public viewing including seating and shade;
- Provide bicycle parking;

- Provide at least one GFI locking receptacle for special event power;
- Provide a drinking fountain with spigot for filling water bottles within 10 metres of the facility;
- Facility will be paved in high quality concrete with a smooth troweled finish;
- Concrete will be tinted to reduce glare; and,
- Jointing will be carefully planned to minimize the number of joints.

Children's Playground and Splash Pad

- Playground will be design to be universally accessible with all equipment meeting accessibility guidelines;
- Playground will be organized into a tot lot and junior play facility to separate children into appropriate age categories and avoid conflicts between older and younger children;
- Provide a variety of play equipment to cater to a range of ages and abilities;
- Seating will be provided in a centrally located area with good visibility to the playground and splash pad;
- Shade at least 25% of the playground area through shade structures and the planting large canopy trees;
- A drinking fountain with spigot for filling water bottles within 10 metres of the facility; and,
- Locate public washrooms within 10 metres of the playground and splash pad.

Field Houses

- Field Houses shall fulfill multiple requirements including wash rooms, change rooms, concession stands and equipment storage;
- Structure shall be designed using similar materials and aesthetic to that of the community centre and school;
- Field house will be located to be easily accessible by vehicles for delivery and maintenance;
- Interior and exterior finishes will be durable and resistant to vandalism to the fullest extent possible;
- Locate electrical panel for sports field lighting inside field house to allow authorized access to lighting controls;
- Locate the irrigation controller for the sports fields inside the field house to allow authorized access to controller;

Picnic Shelters

- Picnic shelters shall be a minimum of 8 metres and 12 metres;
- Shelter shall be placed on a concrete pad
- Shelter shall provide access to running water on a seasonal basis;
- A minimum of 6 picnic tables shall be associated with each shelter;
- A vandal proof light, on a timer, shall be provided with each shelter;
- Picnic shelter will be located to be easily accessible by vehicles for maintenance and garbage pick-up; and,
- Minimum of two garbage receptacles and two recycling receptacles shall be associated with each shelter.

Planting

- Plant native, drought tolerant species to minimize maintenance;
- Plant trees to have access to a minimum of 30 cubic metres of soil per tree (15 cubic metres shared);
- Naturalize areas bordering buffers zones, storm water ponds and drainage courses using a native seed mix;
- and,
- Trees will be planted every 8 to 12 metres along all park roads and in parking areas. Some suitable street tree species are listed below. For a complete list refer to the County of Brant approved planting species.

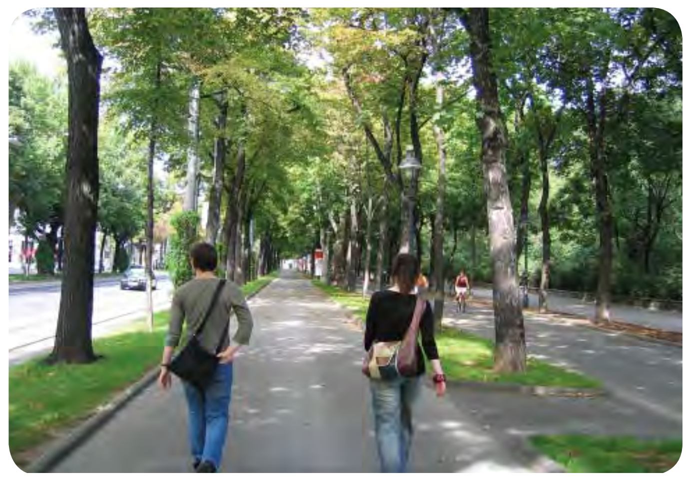


Table 11. Recommended Street Tree Species

Common Name	Latin Name
• Red Maple	Acer rubrum
• Silver Maple	Acer saccharinum
• Freeman's Maple	Acer x freemanii
• Swamp White Oak	Quercus bicolor
• Pin Oak	Quercus palustris
• Red Oak	Quercus rubra
• American Hackberry	Celtis occidentalis
• White Elm (DED-Res)	Ulmus americana
• Japanese Zelkova	Zelkova serrata
• Maidenhair Tree	Ginkgo biloba
• Tuliptree	Liriodendron tulipifera
• Amur Corktree	Phellodendron amurense
• London Planetree	Platanus x acerifolia

Figure 40. Proposed Planting Plan

In parkland areas, between fields and along walkways, some suitable species include:

Table 12. Recommended Parkland Areas Tree Species

Common Name	Latin Name
• Ohio Buckeye	Aesculus glabra
• Horsechestnut	Aesculus hippocastanum
• Amur Maple	Acer ginnala
• Paperbark	Acer grisseum
• Black Maple	Acer saccharum var. nigrum
• Choke Cherry	Prunus virginiana
• Sargent Cherry	Prunus sargentii
• Black Cherry	Prunus serotina
• Blue Beech	Carpinus caroliniana
• Katsuratree	Cercidiphyllum japonicum
• Red Bud	Cercis canadensis
• American Beech	Fagus sylvatica
• Sweet Gum	Liquidambar styraciflua
• American Sycamore	Platanus occidentalis
• Common Sassafras	Sassafras albidum
• Eur. Mountainash	Sorbus aucuparia
• American Basswood	Tilia americana

In naturalized and storm water areas, including storm water management ponds, swales and areas prone to seasonal flooding, native riparian species are suitable. Some suitable species include:

Table 13. Recommended Naturalized Areas Tree Species

Common Name	Latin Name
• Eastern Red Cedar	Juniperus virginiana
• Eastern Tamarack	Larix larincina
• Eastern White Cedar	Thuja occidentalis
• Paper Birch	Betula papyrifera
• Balsam Poplar	Populus balsamifera
• Eastern Cottonwood	Populus deltoids
• Shining Willow	Salix lucida
• Black Willow	Salix nigra
• Beeked Willow	Salix bebbiana
• Devil's Walking Stick	Aralia elata
• Buttonbush	Cephalanthus occidentalis
• Pagoda Dogwood	Cornus alternifolia
• Grey Dogwood	Cornus racemosa
• Common Ninebark	Physocarpus opulifoius
• Smooth Sumac	Rhus glabra
• Staghorn Sumac	Rhus typhina
• Wild Black Currant	Ribes americanum
• Smooth Rose	Rosa blanda
• American Elderberry	Sambucus canadensis

Part 6
IMPLEMENTATION STRATEGY

6.1 The Implementation Strategy

6.1.1 INTRODUCTION

The following implementation recommendations are actions the City of Brantford should consider in order to ensure the achievement of the Vision for the North of Shellard Neighbourhood Plan put forward in this report. These interrelated recommendations provide concrete directives; designed to facilitate public realm and infrastructure improvements and to foster private sector development. While the application of individual recommendations may achieve some of the intended results, the long-term success of the North of Shellard Neighbourhood and Recreation Centre Plan will require the application of all of these recommendations, and, at some point a private sector partner or partners.

The implementation recommendations include administrative changes, suggestions for amendments to planning procedures, and statutory planning policies for both public sector investment and private sector development. This section closes with a broad based land development analysis that contemplates the advantages and disadvantages of selling the Master Plan's neighbourhood component with either an adopted Neighbourhood Plan in place, or by taking the land through draft plan of subdivision and re-zoning processes to sell parcels directly to builders.

The proposed implementation strategy seeks to establish the following elements:

1. Establish the environment for change

It is important to continue work to establish an environment for change in the development of mixed use, high density, and compact pedestrian friendly neighbourhoods. This Vision will further strengthened with the adoption of this report.

2. Reduce the cost of development

High density urban forms of development generally cost more than typical suburban development forms. The City can use tools that help reduce the development costs to private developers and owners, which will increase the likelihood of delivering the North of Shellard Lane Neighbourhood Vision. Methods of reducing the cost of development could include:

- Public/private partnerships; and,
- Providing financial incentives.

Public/private partnerships can be established to develop the Neighbourhood Plan. The private sector will bring development industry expertise to the table, while the City will supply the land.

A reduction of development costs can also be achieved through the provision of financial incentives through tax incentives or reduced development charges.

3. Reduce the risk of the approval process.

A private developer will be more likely to develop if there is more certainty surrounding the planned vision and the approval process. While the North of Shellard Lane community vision is consistent with the West of Conklin Secondary Plan, an updated zoning By-law could provide the regulatory basis to facilitate the Vision, and provide greater certainty as to the

City's development expectations. Pre-zoning for the desired types and forms of development, transfers the risk of the development approvals process to the municipality. The pre-zoning exercise should be land use and built form based, and should clarify municipal development objectives.

Further site plan approval would deal with the details of development and reduce the development's risk factor.

The following section provides a list of priority actions to implement the North of Shellard Lane Neighbourhood and Recreation Centre Plan Report.

6.1.2 RECOMMENDATIONS

POLICY

1. **Adoption of the North of Shellard Neighbourhood and Recreation Centre Master Plan**

The adoption of this report is a critical first step in managing future development, as it establishes the framework for future development and investment decisions. Key elements on which the delivery of the North of Shellard vision hinges are:

- The adoption of the Sustainable Guidelines framework contained in this report. The Guidelines can be implemented through a private sector incentive program; and,
- The adoption of the road hierarchy and accompanying road standards included in this report. In order to deliver the Vision, the City must provide appropriate road and on-street parking standards and related design policies that are consistent with increased transit ridership, greater pedestrian activity and diminished automobile use.

2. **Prepare Secondary Plan Amendment**

The City should amend its current West of Conklin Secondary Plan to allow for a recreation use permission of the size and scope proposed in this report. The amendment should set up general polices that revise the recreation centre's current land use designations of Neighbourhood Residential and Neighbourhood Centre to allow for the proposed scale of future institutional uses.

3. **Update governing Zoning-By-law**

Consideration should be given to the update of the existing zoning-by law as to allow for the proposed built form massing, height and parking requirements the North of Shellard Vision has put forward.

CAPITAL PROJECTS

1. **Development of the Recreation Centre**

The development of the North of Shellard Recreation Centre Plan will ensure that the City is setting the stage for development and providing a clear statement to the private sector that it will continue to invest in this area over the long term.

The City, in conjunction with Brantford's Public Library and Grand Erie's District School Boards, should prepare an RFP for Architectural and Landscape Architecture services to undertake a site plan process for the proposed Recreation

Centre Plan. While development of individual institutional buildings can occur at varying times, due to specific phasing and need requirements, the overall detailed architectural proposal should be established from the onset.

The overall plan is to be detailed in conjunction with the sports fields and required parking areas.

A preliminary sports fields area site plan studies budget has been included for reference purposes only *(refer to Table 13)*.

2. Development of the North of Shellard Community

Further to the implementation strategy presented above, the development of the North of Shellard Community component can be undertaken through one of the following three options:

Option 1 - Neighbourhood Plan

Strategy

This option contemplates the opportunity of selling the Neighbourhood Plan area component with an adopted Neighbourhood Plan in place. This requires that purchasers move through the Draft Plan and Re-zoning processes on their own, with the ability to make minor adjustments to the Plan. This strategy could include multiple purchasers, who would ultimately need to work together. Alternatively, a "master developer" could purchase the entire holding.

The North of Shellard Neighbourhood Plan area is 45.62 ha (112.73ac) in size and is held by three owners. The lands of the easterly most owner are within the proposed Recreation Centre Plan only and, in consequence, are not considered in this land calculation. The City owns 34.85 ha (86.12ac) which represent 76.40% of the community lands *(refer to Table 14)*.

Based on a 2011 raw development land pricing in the Shellard Lane area of between $247,158.00 to $296,590.00 per hectare ($100,000.00 to $120,000.00 per acre), the North of Shellard Neighbourhood lands could be sold for $8,613,456.00 to $10,336,162.00. However, this data represents raw land pricing and does not represent the pricing uplift generated by an adopted Neighbourhood Plan.

Actions

1. The City is to prepare a Real Estate Analysis Report to further understand the land pricing uplift generated by the adoption of this report; and,
2. The City, through its Real Estate Department can sell the lands.

Option 2 - Draft Plan of Subdivision

Strategy

In order for the City to develop the community lands, the City will need to set up an arms-length development corporation to oversee the project. A development corporation is a government-sponsored enterprise with the task of redeveloping City owned lands. The City has had previous experience establishing development corporations to manage and oversee specific developments for small development projects.

Draft approved City owned lands could potentially be expected to be sold for a 10% land value increase based on similar subdivision developments in the GTA versus the 1.23% annual prime rate generated dividend of Option 1. While the financial advantages of this option are clear, the City's development timing and financial risks are also increased. A careful understanding of City wide capital works and related cash flow needs is required prior to selecting this option.

Based on current City of Brantford and Grand River Conservation Authority Draft Plan of Subdivision requirements a preliminary Draft Plan of Subdivision studies budget is included as a reference. An approximate total budget of $250,000.00 to $300,000.00 *(refer to Table 15)* is required to submit a complete draft plan of subdivision application. A two year approval process period has been assumed is required to complete this process.

Actions

1. The City is to prepare a Real Estate Analysis Report to further understand the land pricing uplift generated by a draft plan of subdivision process within the Brantford context. A City wide understanding of capital projects and cash flow needs is required in conjunction with the financial recommendations resulting from the above mentioned real estate analysis in order to decide on the adoption or rejection of this option; and,
2. The City should set up a Development Corporation.

Please note that enclosed tables 14 and 15 contain City of Brantford and Grand River Authority submission requirements at the time this report was completed which will need to be confirmed at commencement of the Draft Plan of Subdivision and Site Plan stages.

Option 3 - Public/Private Partnership

Strategy

The City in conjunction with the private sector could partner in the development of the North of Shellard Neighbourhood area. Advantages of this option include a shared financial development risk where the City contributes the land and the private industry fulfills the role otherwise assumed by the City's Development Corporation as proposed in Option 2.

Actions

1. The City Planning and Real Estate Departments shall prepare a Real Estate Analysis Report to further understand the advantages of developing these lands.
2. The City shall issue a call for partnership tenders to enter into a development agreement with a private sector company.

DETAILED STUDIES

1. Prepare a detailed Streetscape Plan for Shellard Lane as a direct result of the current EA and recommendations contained in this report to describe the final and specific conditions of the right-of-way. This will be particularly important to inform the draft and site plan stage of the Neighbourhood and Recreation Centre areas;
2. Prepare detailed Architectural Control Guideline for the Neighbourhood component; and,
3. Consider holding design competitions for the Recreation Centre buildings.

GOVERNANCE

The City should continue to collaborate and support negotiations with the City of Brantford Library and the Grand Erie District School Boards.

Table 14. Site Plan Process

	Recreation Centre Site Plan Required Reports	Estimated Fees*
1	Official Plan Amendment	City of Brantford Planning Department
2	Archaeological Assessment *(Stage 2)*	$6,500.00
3	Building Details *(including elevations, colours, materials, etc.)*	to be provided by architect in charge and implemented through Architectural Control Guidelines
4	Environmental Impact Study	Preliminary Study Completed
5	Environmental Impact Assessment & Tree Preservation Study	$25,000.00
6	Landscape Restoration Plan (SWM ponds, pond outlets, etc)	$2,000.00
7	Preliminary Functional Servicing Report	Preliminary Study Completed
9	Storm Water Management Report	$25,000.00
10	Detailed Servicing Report (includes grading)	$20,000.00
13	Park Concept Plan	Completed
19	Detailed Site Plan	$30,000.00
20	Soils Report	$6,000.00
21	Geotechnical Study	$10,000.00
22	Survey (completed within the last five years preceding Application submission showing all buildings/structures currently located on property)	Completed
23	Traffic/Transportation Impact Study	Preliminary Study Completed
24	Final Traffic and Transportation Impact Study	$15,000.00
25	Top-of-Bank Demarcation	completed
26	Urban Design Guidelines	Draft Guidelines Completed
27	Sports fields Construction (incld. Landscaping)	$24,000.00
	TOTAL	$163,500.00

Required Documentation already completed or preliminary studies completed by TPP and Sub Consultants thorugh this process

* Fees estimated in June 2011. Fees exclude applicable taxes and include all fees and disbursements.

Table 15. North of Shellard Lane Community Plan Land Ownership

	North of Shellard Lane Community + Rec Centre MP		
	Rec Centre Area	Community Area	
	Gross Area (ha)		Ownership % of **Community Area**
City of Brantford Total	34.80	34.85	76.40%
Vizsy Property		9.65	21.15%
Gasbarini Property	13.7		0.00%
Chaney Property		1.12	2.45%
Total Gross Study Area (ha)	48.5	45.62	100%
Grant Total Study Area (ha)		94.12	

Table 16. Draft Plan Process

	Draft Plan of Subdivision and Re-Zoning Requirements	Estimated Fees*
1	Archaeological Assessment *(Stage 2)*	$7,500.00
2	Building Details *(including elevations, colours, materials, etc.)*	to be provided by future builder and implemented through Architectural Control Guidelines
3	Environmental Impact Study	Preliminary Study Completed
4	Environmental Impact Assessment & Tree Preservation Study	$15,000.00
5	Landscape Restoration Plan (SWM ponds, pond outlets, etc)	$2,000.00
6	Preliminary Functional Servicing Report	Preliminary Study Completed
7	Functional Servicing Report	$70,000.00
8	Storm Water Management Report	$50,000.00
9	Neighbourhood Design Plan	Completed
10	Noise and/or Vibration Study	$10,000.00
11	Market Study	$6,000.00
12	Street Parking Study	$2,000.00
13	Planning Justification Report	$6,000.00
14	Draft Plan of Subdivision	$10,000.00
15	Re-Zoning	$20,000.00
16	Soils Report	$10,000.00
17	Geotechnical Study	$10,000.00
18	Survey (completed within the last five years preceding Application submission showing all buildings/structures currently located on property)	Completed
19	Traffic/Transportation Impact Study	Preliminary Study Completed
20	Final Traffic and Transportation Impact Study	$30,000.00
21	Top-of-Bank Demarcation	completed
22	Urban Design Guidelines	Draft Guidelines Completed
	TOTAL	$248,500.00

	Required Documentation already completed or preliminary studies completed by TPP and Sub Consultants
*	Fees estimated in June 2011. Fees exclude applicable taxes and incude all fees and disbursments.

Part 7
APPENDIX

A. Stage 1 Archaeological Resource Assessment

STAGE 1 ARCHAEOLOGICAL RESOURCE ASSESSMENT OF
NORTH OF SHELLARD LANE NEIGHBOURHOOD AND RECREATION PLAN
CITY OF BRANTFORD, ONTARIO

Prepared for

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Archaeological Licence P049
MTC CIF P049-608-2010
ASI File 10SP-039

November 2010

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STAGE 1 ARCHAEOLOGICAL RESOURCE ASSESSMENT OF
NORTH OF SHELLARD NEIGHBOURHOOD AND RECREATION PLAN
CITY OF BRANTFORD, ONTARIO

EXECUTIVE SUMMARY

Archaeological Services Inc. was contracted by the Planning Partnership on behalf of the City of Brantford to conduct a Stage 1 Archaeological Assessment of the North of Shellard Neigbourhood and Recreation Plan, located on Part of the Kerr Tract, Lots 3-5, City of Brantford, County of Brant. The subject property is comprised of approximately 197 hectares.

The assessment entailed consideration of the proximity of previously registered archaeological sites, the pre-development environmental setting of the property and a summary review of nineteenth- and twentieth-century mapping. This research has identified 23 registered archaeological sites within the proposed developable area and six registered archaeological sites within the Natural Heritage System. These sites were registered as a result of a Stage 1 and 2 archaeological assessment previously completed by Archaeological Services Inc. in 1988. The review of the historical mapping did not identify any historical homesteads within the study area, however, the area is within close proximity to D'Aubigny Creek and the Brantford & Norwich & Port Burwell Railroad (B&N&P.B.R.R.) The study area is also adjacent to Shellard's Lane, a historical transportation route.

The assessment included a Stage 1 field review of the property to review the current land conditions. The field review found that there have been no significant changes to the landscape since the 1988 survey. The subject lands consist of actively farmed lands, adjacent wooded areas and two residences fronting Shellard's Lane.

A Stage 2 archaeological assessment is recommended for the study area prior to any land-disturbing activities, as the previous survey was not completed in accordance with the current Ministry of Tourism and Culture Standard's and Guidelines for Consulting Archaeologist (2010).

ARCHAEOLOGICAL SERVICES INC.
PLANNING DIVISION

PROJECT PERSONNEL

Project Manager:	Dr. Ronald Williamson, PhD Chief Archaeologist and Managing Partner
Project Director:	Debbie Steiss, MA, Partner & Senior Archaeologist (P049)
Project Archaeologist:	Dr. Andrew Riddle, PhD Staff Archaeologist (R146)
Report Preparation:	Beverly Garner, Hons. BA, Assistant Manager
Graphics:	Nicole Gavin, Hons. BA, Staff Archaeologist (R353) Sarina Finlay, Hons. BA, GIS Specialist
Report Reviewer:	Dr. Ronald Williamson

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1.0 INTRODUCTION

Archaeological Services Inc. was retained to conduct a Stage 1 archaeological assessment of the North of Shellard Neighbourhood and Recreation Plan located in the City of Brantford, Brant County, Ontario (Figure 1). The study area, which measures approximately 197 hectares, falls within the area examined for the Archaeological Master Plan for the City of Brantford (ASI 1997). That study, which has been recently updated as part of the City's Official Plan Review Program, forms the basis for much of the present assessment.

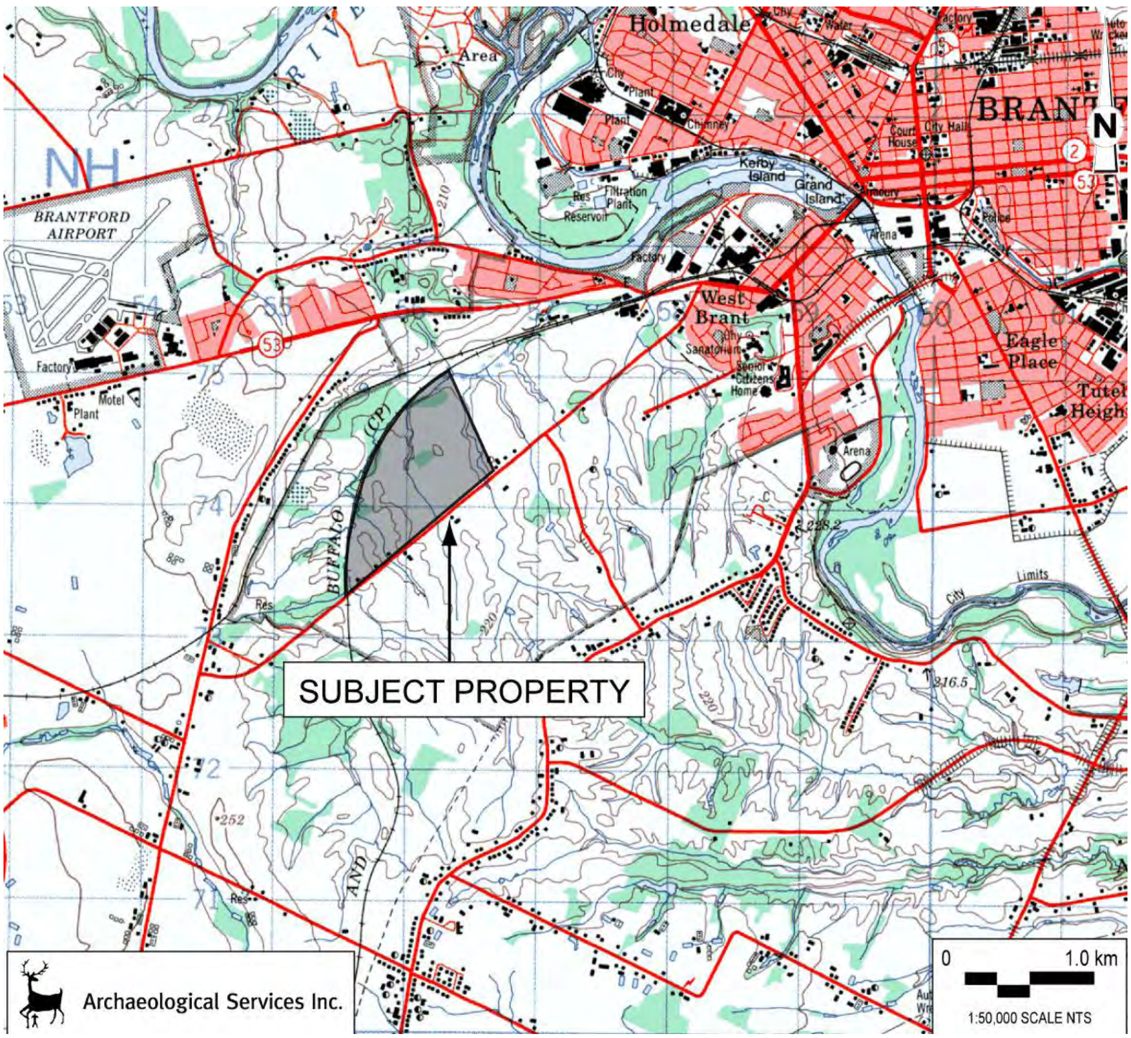

Figure 1: The location of North of Shellard Neighbourhood and Recreation Plan, City of Brantford
NTS Sheet 40P/1 (Brantford), Edition 7, 1994

This assessment was conducted under the project direction of Ms. Debbie Steiss under archaeological license P049 (MCL CIF P049-2010) issued to Ms. Steiss pursuant to the Ontario Heritage Act (2005). Dr. Ronald Williamson served as the Project Manager for the study. Permission to access the study area and carry out the activities necessary for the completion of the assessment was granted to Archaeological Services Inc. by the Planning Division of the City of Brantford by way of the Planning Partnership in September, 2010.

2.0 BACKGROUND RESEARCH

2.1 Physiographic Setting

The City of Brantford is situated at the interface between the Haldimand Clay Plain physiographic region to the east and the Horseshoe Moraines and Norfolk Sand Plain physiographic regions to the west (Chapman and Putnam 1984). The structures of these landforms, and the specific environmental features they contain, have influenced land use in the City of Brantford throughout history. The greatest influencing factors, however, have been the Grand River, and the large concentration of fertile silt soils in the area. The Grand was highly important in terms of the precontact occupations of the entire area since it constituted both a truly rich biotic environment and the most important transportation route between Lake Erie and the interior of southern Ontario.

The City of Brantford, including the study area, is underlain by dolomite and shaly dolomite of the Upper Silurian Salina Formation and dolomite of the Middle Silurian Guelph formation. The bedrock topography varies locally on the order of 3 to 6 metres, ranging to over 120 metres in buried valleys. Most of this variation has been subdued by overlying Quaternary deposits which range in depth from about 10 to 75 metres (Cowan 1972:4-10).

Although underlying tills of Early Wisconsinan age have been identified in the Brantford area, the bulk of the drift is composed of Late Wisconsinan deposits. During the Missouri stade of around 18,000-20,000 B.P. the Catfish Creek till was laid down by a glacier moving generally from northeast to southwest. This was followed by glacial retreat during the Erie Interstade of ca. 15,000 B.P., during which glaciolacustrine sediments of stratified to varved silts and clays and stratified sand were deposited. Around 14,000 years ago, glacial re-advance of the Port Bruce stade reworked the fine-grained lacustrine sediments into the Port Stanley Till. The Port Stanley ice sheet then retreated to the east of Brantford and the brief Mackinaw interstade ensued. A strong glacial advance then pushed westward to form the Paris Moraine during the Port Huron stade. The Wentworth Till and outwash gravels were also laid down at this time. As the Port Huron ice sheet retreated there was further deposition of outwash—particularly within the Grand River spillway—and the formation of the Galt and Moffat moraines. The retreating ice sheet also contributed to the formation of glacial Lake Whittlesey which is dated to around 13,000 B.P. This lake and its successor, Lake Warren, produced well-defined shoreline features along the eastern side of the Galt Moraine, including prominent beach ridges at St. George. They also laid down near-shore deposits of sand in the vicinity of the morainic uplands and deep-water deposits of silt and clay to the east. As the glacial lake waters receded around 12,000 years ago, high-level alluvial deposits were laid down along the major water courses (Acton 1989; Calkin and Feenstra 1985; Calkin and Barnett 1990; Chapman and Putnam 1984; Cowan 1972; Karrow 1987:24-30).

Since de-glaciation, significant deposits of alluvium have accumulated in the vicinity of Brantford as a result of a rapid decrease in gradient of the Grand River where it crosses the Galt Moraine (Cowan 1972: 3). As the Grand and its tributaries flow out across the easily eroded silts and clays of the Haldimand clay plain, they have developed deep, meandering courses. The resulting dissection of the plain is the major source of relief in this otherwise relatively flat physiographic area.

The study area is situated within the Deciduous Forest Region of Canada, and its general forest type is classified as Southern Hardwood. The Deciduous Forest Region contains trees common to the adjacent Great Lakes-St. Lawrence Region, such as sugar maple (*Acer saccharum*), beech (*Fagus grandifolia*), white elm (*Ulmus americana*), basswood (*Tilia americana*), red ash (*Fraxinus pennsylvanica*), white oak (*Quercus alba*) and butternut (*Juglans cinera*). In addition, Carolinian species, found more commonly to the south, include tulip-tree (*Liriodendron tulipifera*), cucumber tree (*Magnolia acuminata*), pawpaw (*Asimina triloba*), red mulberry (*Morus rubra*), Kentucky coffee tree (*Gymnocladus dioicus*), redbud (*Cercis canadensis*), black gum (*Nyssa sylvatica*), blue ash (*Fraxinus quadrangulata*), sassafras (*Sassafras albidum*), mockernut hickory (*Carya tomentosa*), pignut hickory (*Carya glabra*), black oak (*Quercus velutina*), pin oak (*Quercus palustris*), swamp white oak (*Quercus bicolor*), black walnut (*Juglans nigra*), and sycamore (*Platanus occidentalis*). Coniferous species tend to be restricted to the more sterile or wet soils, and include eastern white pine (*Pinus strobus*), tamarack (*Larix laricina*), eastern red cedar (*Juniperus virginiana*), and eastern hemlock (*Tsuga canadensis*) (Hosie 1979; White and Hosie 1980).

Over the past 200 years, the forest-cover of the area has been reduced to the point that it scarcely resembles its original state. A number of sources are available to permit the reconstruction of local vegetation prior to Euro-Canadian settlement in the late eighteenth century. Brantford Township was originally surveyed by Lewis Burwell in 1831 and 1833, by Thomas Blyth in 1843, and by William Walker in 1845, and vegetation information from the notes of these surveyors has been transcribed onto a cadastral base map of Brant County (Finlay 1978). A strong correlation can be observed between vegetation and surficial geology/soils. On the coarse-textured soils of the morainic uplands and adjacent outwash, the predominant species is oak, (*Quercus* sp.) with a notable presence of pine (likely white pine, *Pinus strobus*). Several open plains are also noted in this context. It has been suggested that oak savanna replaced white pine as the dominant upland forest type between 6000 and 4000 B.P., and that the persistence of oak and pine is attributable to the dry substrates which restricted colonization by trees such as maple and beech which prefer more mesic soil-moisture regimes (Szeicz and MacDonald 1991). On the fine-textured soils of the glacio-lacustrine plain, maple (likely sugar maple) and beech predominate, with frequent associates of oak, pine, basswood, elm, and ironwood (*Ostrya virginiana*) (Maycock 1963; Szeicz and MacDonald 1991).

A wide variety of wild plant resources was available to the inhabitants of the area. Common nut-bearing trees found in the upland oak savannahs flanking the river valley are likely to have included black walnut, butternut (*Juglans cinerea*), hickory (*Carya* sp.), oaks, American beech, and American chestnut (*Castanea dentata*). The Grand River floodplain and associated wetlands also would have offered a wide variety of resources, including foods such as roots, tubers, greens, and berries, as well as fibres and building materials, such as bark and cedar (*Thuja canadensis*) poles.

Fleshy fruits such as elderberry (*Sambucus canadensis*), cherry (*Prunus* sp.), plum (*Prunus* sp.), apple (*Malus coronaria*), currant (*Ribes* sp.), strawberry (*Fragaris* sp.), and bramble (*Rubus* sp.) would all have flourished in disturbed or forest-edge habitats.

White-tailed deer (*Odocoileus virginianus*) would have been attracted to the open woodlands of the oak savannah during the fall, while wetlands along the Grand River would have also provided forest edge zones for spring and summer forage, as well as conifers for winter shelter. Additionally, wapiti (*Cervus canadensis*) may have occupied the oak savannahs, while the wetlands would have provided suitable habitat for moose (*Alces alces*).

The Grand River floodplain, and adjacent oak savannahs would also have been attractive to black bear (*Ursus americanus*) and a wide variety of smaller mammal species, including raccoon (*Procyon lotor*), snowshoe hare (*Lepus americanus*) and eastern cottontail (*Sylvilagus floridanus*) and eastern cottontail, while beaver (*Castor canadensis*) and muskrat (*Ondatra zibethica*) would have occupied the banks of the Grand River and its tributaries.

The Grand River valley also represents a significant area of waterfowl habitat, although the limitations of this area are considered moderately severe as a result of topography which limits the development of permanent wetlands and adversely affects the development of optimum marsh conditions along the waterfront. Nevertheless, the stretch of the Grand River between Brantford and Cambridge is noted as an important migration and wintering area. The main breeding species include: mallard duck (*Anas platyrhynchos*), blue-winged teal (*Anas discors*), wood duck (*Aix sponsa*), and black duck (*Anas rubripes*) (Johnson 1968).

The oak savanna and forest openings along the Grand River would have provided ideal habitats for upland game birds, particularly passenger pigeon (*Ectopistes migratorius*) and wild turkey (*Meleagris gallopavo*).

The Grand River, its tributaries and associated wetlands supported a number of fish species that would have been significant sources of dietary protein. Potentially important species include lake sturgeon (*Acipenser fulvescens*) bowfin (*Amia calva*), northern pike (*Esox lucius*), muskellunge (*Esox masquinongy*), channel catfish (*Ictalurus punctatus*) smallmouth bass (*Micropterus dolomieui*), yellow perch (*Perca flavescens*), and walleye (*Stizostedion vitreum*).

2.2 Previous Archaeological Research

In order that an inventory of documented archaeological resources could be compiled for the study area, three sources of information were consulted: the site record forms for registered sites within the Ontario Archaeological Sites Database (OASD) housed at the Ministry of Culture; published and unpublished documentary sources, including the Archaeological Master Plan for the City of Brantford Technical Report (ASI 1997), updated in 2006 (ASI 2006); and the files of Archaeological Services Inc. In Ontario, archaeological sites are registered within the Borden system. Under the Borden system, Canada has been divided into grid blocks based on latitude and longitude. A Borden block is approximately 13 kilometres east to west, and approximately 18.5 kilometres north to south. Each Borden block is referenced by a four-letter designator, and sites within a Borden block are numbered sequentially as they are found. The study area under review falls within Borden Block AgHb.

The entire study area was subject to a Stage 1 and 2 archaeological assessment in the spring of 1988 by Archaeological Services Inc. (ASI 1988a, 1988b). This assessment was carried out in anticipation of proposed development within the subject lands by a previous owner. The conditions at the time of the Stage 2 field survey were considered fair to good. The property had been ploughed in the fall of 1987 using a soil saving technique. This process had left considerable corn stubble on the surface of the fields, therefore the visibility for the survey was hindered by the crop debris. The survey was completed by both pedestrian and test pit survey (of wooded areas) at five metre intervals. When artifacts were identified, the transect interval was reduced to 50 cm to one metre. All artifacts were flagged and an estimate of the size of the site was determined and recorded. All diagnostic artifacts, along with a representative sample of flakes were collected. The Stage 2 survey resulted in 23 archaeological sites being registered within the developable planning area (Table 1). Table 2 provides a summary of the sites that have been registered within the Natural Heritage System.

Table 1: Registered Archaeological Sites Within the Study Area; Inside the Area of Development

Borden	Cultural/Temporal Affiliation	Site Type	Site Size	Researcher
AgHb-65	Early Archaic	Findspot (Bifurcate Base Point)	Isolated find	ASI, 1988
AgHb-66	Historic Euro-Canadian	Findspot (Isolated Gunflint)	Isolated find	ASI, 1988
AgHb-67	Late Archaic	Findspot (Corner-Notched Point)	Isolated find	ASI, 1988
AgHb-68	Undetermined Pre-contact	Lithic Scatter (15-20)	10m x10m, 100m^2	ASI, 1988
AgHb-69	Undetermined Pre-contact	Lithic Scatter (15-20)	20m x20m, 400m^2	ASI, 1988
AgHb-70	Early Woodland	Lithic Scatter (15-20) Early Woodland Drill Base	20m x20m, 400m^2	ASI, 1988
AgHb-72	Undetermined Pre-contact	Lithic Scatter	10m x10m, 100m^2	ASI, 1988
AgHb-74	Undetermined Pre-contact	Lithic Scatter (20-25)	30m x 50m, 1500 m^2	ASI, 1988
AgHb-75	Early Archaic	Findspot (Nettling Point)	Isolated find	ASI, 1988
AgHb-76	Undetermined Pre-contact	Findspot (Isolated Celt)	Isolated find	ASI, 1988
AgHb-82	Undetermined Pre-contact	Lithic Scatter (20-30)	10m x 20m, 200 m^2	ASI, 1988
AgHb-83	Undetermined Pre-contact	Lithic Scatter (20-30)	20m x20m, 400m^2	ASI, 1988
AgHb-84	Undetermined Pre-contact	Lithic Scatter (20-30)	20m x 30m, 600 m^2	ASI, 1988
AgHb-85	Undetermined Pre-contact	Lithic Scatter (5)	5m x5m, 25m^2	ASI, 1988
AgHb-86	Late Archaic	Findspot (Corner-Notched Point)	Isolated find	ASI, 1988
AgHb-87	Undetermined Pre-contact	Lithic Scatter (15-20)	10m x10m, 100m^2	ASI, 1988
AgHb-88	Undetermined Pre-contact	Lithic Scatter (5)	5m x5m, 25m^2	ASI, 1988
AgHb-89	Undetermined Pre-contact	Lithic Scatter	5m x5m, 25m^2	ASI, 1988
AgHb-103	Undetermined Pre-contact	Lithic Scatter (5)	5m x5m, 25m^2	ASI, 1988
AgHb-104	Undetermined Pre-contact	Lithic Scatter (15-20)	10m x10m, 100m^2	ASI, 1988
AgHb-105	Late Archaic	Findspot (Side-Notched Point)	Isolated Find	ASI, 1988
AgHb-106	Undetermined Pre-contact	Lithic Scatter (15-20)	20m x20m, 400m^2	ASI, 1988

AgHb-125	Undetermined Pre-contact	Lithic Scatter (15-20)	15m x 20m, 300 m^2	ASI, 1988

Table 2: Registered Archaeological Sites Within the Study Area; In the Natural Heritage System

Borden	Cultural/Temporal Affiliation	Site Type	Site Size	Researcher
AgHb-71	Undetermined Pre-contact	Findspot (Crude Biface)	Isolated find	ASI, 1988
AgHb-77	Late Archaic	Lithic Scatter (20-25)	20m x30m, 600m2	ASI, 1988
AgHb-78	Undetermined Pre-contact	Lithic Scatter (15-20)	10m x 20m, 200 m2	ASI, 1988
AgHb-79	Undetermined Pre-contact	Lithic Scatter (15-20)	10m x10m, 100m2	ASI, 1988
AgHb-80	Undetermined Pre-contact	Lithic Scatter (15-20)	20m x 30m, 600 m2	ASI, 1988
AgHb-81	Undetermined Pre-contact	Lithic Scatter (15-20)	20m x 30m, 600 m2	ASI, 1988

2.2.1 Sites Located Within the Proposed Area of Development

AgHb-65

This was an isolated find of a bifurcate base projectile point dating to the Early Archaic ca. 7000 BC.

AgHb-66

The find recovered at AgHb-66 consists of an isolated historic gunflint.

AgHb-67

AgHb -67 is comprised of an isolated corner-notched projectile point base. The cultural affiliation of the point is Late Archaic ca. 2000-1000 BC.

AgHb-68

AgHb-68 consists of a lithic scatter of approximately 15-20 flakes covering an area of 10 m by 10 m. The site is situated on a slope above a dry creek bed. A total of six flakes was collected.

AgHb-69

AgHb-69 is also a lithic scatter of approximately 15-20 flakes covering an area of 20 m by 20 m on a slope above a small creek. A total of three flakes and five flake fragments was collected.

AgHb-70

AgHb-70 is a larger lithic scatter of 40-50 flakes. This scatter extends over an area of approximately 20 m by 20 m along the slope of a ridge. One small biface fragment or Early Woodland drill base was collected. The Early Woodland drill base dates to ca. 500-800 BC.

AgHb-72

AgHb-72 is a light lithic scatter of flakes that may represent a few discrete clusters. The location of the site is within a saddle between two ridges and up the slope to the north. Nine flakes, a partial flake, a core fragment and a biface fragment were collected.

AgHb-74

A lithic scatter consisting of 20-25 flakes were identified on the surface of the site. The scatter extended over an area of 30 m by 50 m. No artifacts were collected during the Stage 2 survey.

AgHb-75

AgHb-75 consists of an isolated find of a small corner-notched point of the Early Archaic Nettling type ca. 7000 BC.

AgHb-76

Was an isolated find of a ground stone celt fragment bit end.

AgHb-82

This site consists of a lithic scatter of 20-30 flakes located on the west facing slope above a small seasonal creek. The scatter is approximately 10 m by 20 m in extent. A core fragment, two utilized flakes and two flakes were collected.

AgHb-83

Another light lithic scatter of 25-30 flakes was found to the southeast and up the slope from AgHb-82. The extent of the scatter is approximately 20 m by 20m. No artifacts were collected during the Stage 2 survey.

AgHb-84

This site 4 is a lithic scatter of 35-40 flakes covering an area of approximately 20 m by 30 m, situated on the top of a knoll. Two retouched flakes, two retouched flake fragments and one core were collected from the surface.

AgHb-85

This represents a cluster of lithic artifacts observed on the surface to the north and just down slope of AgHb-84. No artifacts were collected during the Stage 2 survey.

AgHb-86

This was an isolated find of a notched Late Archaic projectile point, ca. 2000-1000 BC, found just to the north and down slope of AgHb-85.

AgHb-87

This site is a lithic scatter of 10-15 flakes extending over an area of approximately 10 m by 10 m just east of AgHb-84. No artifacts were collected during the Stage 2 survey.

AgHb-88

Approximately five flakes were observed just south of AgHb-84. No artifacts were collected during the Stage 2 survey.

AgHb-89

This too is a small cluster of lithic artifacts located southeast of AgHb-84. One core and three flake fragments were collected.

AgHb-103

This small cluster of lithic artifacts was also documented southeast of AgHb-84. One biface, two flakes, two flake fragments and one piece of shatter were collected.

AgHb-104

AgHb-104 is a light lithic scatter of approximately 15 flakes extending over an area of 10 m by 10 m located to the west of AgHb-84.

AgHb-105

AgHb-105 is an isolated find of a large crudely manufactured projectile point. The point is side-notched and likely of Late Archaic affiliation ca. 2000-1000 BC.

AgHb-106

AgHb-106 consists of a light lithic scatter of flakes covering an area of approximately 20 m by 20 m in an area which is situated between several knolls. Two cores, one biface fragment, one retouched flake, one retouched flake fragment and three flakes were collected. It is estimated that a small section of this site is within the current study area while the majority of site area is located to the east.

In 1993, a Stage 3 assessment was carried out by Golder Associates (Golder 1994) on the parcel that is adjacent to the current study area to the east. The area of the site had been reploughed and an additional 10 artifacts were recovered during a controlled surface collection. Six one metre test squares were also excavated yielding an additional 40 artifacts. One test unit contained 11 pieces of calcined bone, while the remaining artifacts were all Onondaga lithics.

A partial feature was exposed during the excavation of one test square. This feature yielded the calcined bone. The feature was not completely excavated. The report by Golder Associates recommended a Stage 4 assessment for the site (Golder 1994).

In 2004, a Stage 2 assessment was completed by Mayer Heritage Consultants Inc. of the Shellard Lane Subdivision Phase 4 (MHCI 2004). The Stage 2 was requested by the Ministry of Culture to further assess site (AgHb-106). During the course of the Stage 2 completed by MHCI, a further 25 artifacts were identified on the surface including one biface tip. Only the biface tip was collected. The report by MHCI recommended a Stage 3 assessment.

AgHb-125

The final site within the proposed area of development is a lithic scatter of approximately seven flakes. The scatter extends over an area of five by five m. No artifacts were collected during the Stage 2 survey.

2.2.2 Sites Located Within the Natural Heritage System

AgHb-71

AgHb-71 is a very small lithic scatter of a few flakes observed within an area of approximately 10 m by 10m. One biface was collected.

AgHb-77

AgHb-77 is a lithic scatter of approximately 25-30 flakes covering an area of 20 m by 30 m. The site is located in a flat area between two knolls and up the slope to the north. A Late Archaic projectile point ca. 2000-1000 BC was identified. In addition, two biface fragments, two flakes eight partial flakes and one piece of shatter were collected.

AgHb-78

AgHb-78 is a light lithic scatter of flakes just off the top of a knoll. The site covers an area of approximately 10 m by 20 m and one core, two retouched flake fragments and three flakes were collected. An additional 10-15 flakes were observed on the surface but not collected.

AgHb-79

Site AgHb-79 is a small lithic scatter of flakes located just north of AgHb-78. The site extends over an area of approximately 10 m by 10 m. One retouched flake, five flakes, a core fragment, two flake fragments and one piece of shatter were collected.

AgHb-80

AgHb-80 is a small lithic scatter located just east of AgHb-78 and 79. The site is approximately 20 m by 30 m in extent. A drill midsection, two biface fragments and one retouched flake were collected.

In addition, to the 1988 Stage 1 and 2 archaeological assessment of the subject lands, an avocational archaeologist had also reported a number of discoveries within the North of Shellard Neigbourhood and Recreation Complex study area. These consist of a large area of artifacts in the area around AgHb-70. In the extreme southwest corner of the subject lands where Shellard's Lane and the extinct rail line meet, a small area of artifacts were also documented. Artifacts were also found in the northeast quadrant of the subject lands in the same location as AgHb-78 and 79. These locations appear as unregistered archaeological sites on Figure 2.

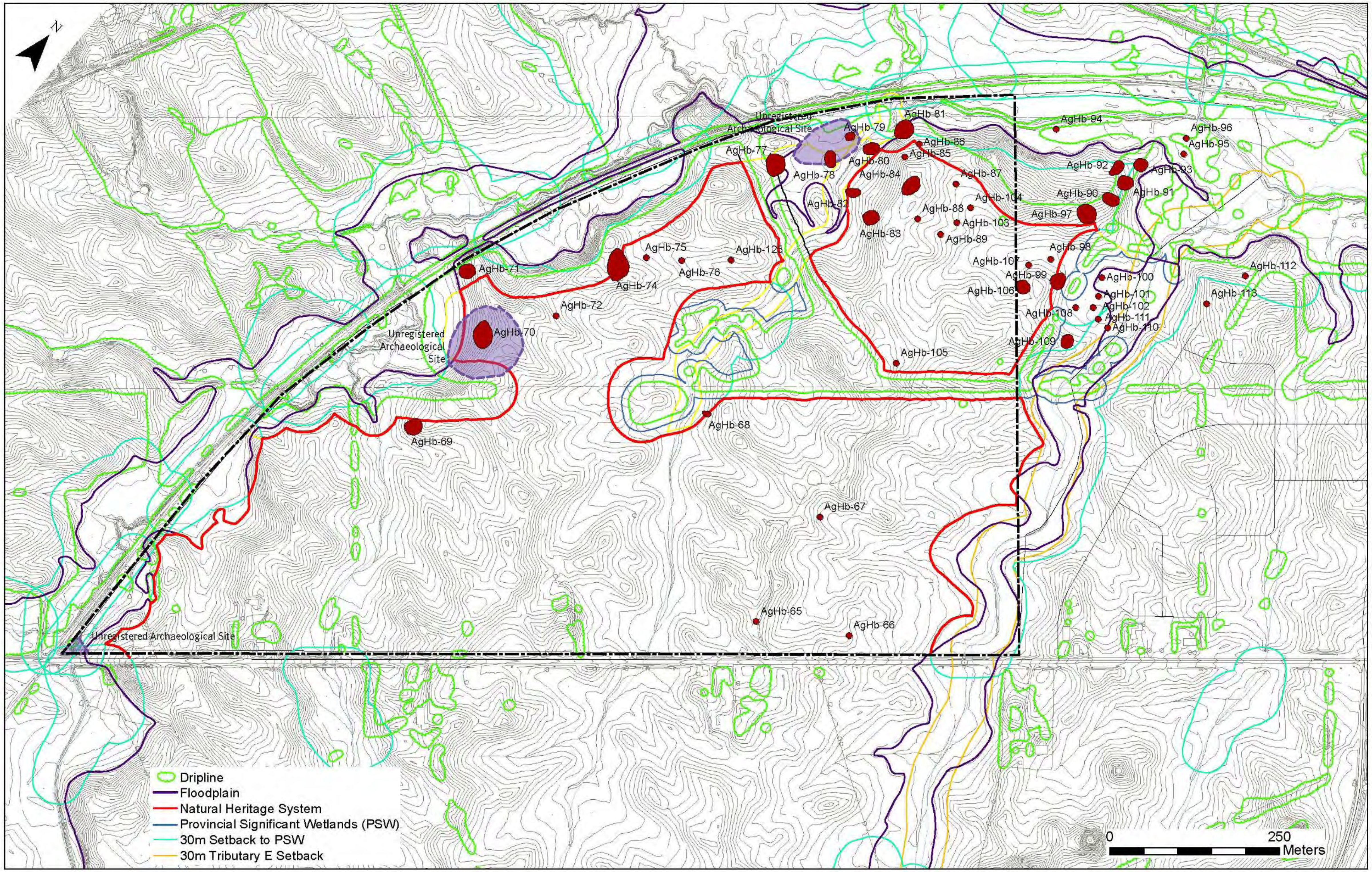

Figure 2: Location of Registered and Unregistered Archaeological Sites within the North Shellard Neighbourhood and Recreation Plan

Archaeological Services Inc.

2.3 Summary Review of Nineteenth Century Maps

The archaeological master plan for the City of Brantford included the identification of areas of early Euro-Canadian settlement and development as documented in historical maps and atlases and evaluated in terms of historical themes considered to have been most significant in the City. The map sources used included Lewis Burwell's 1830 *Brantford in the Gore District, Canada*, 1833 *Map of the Town Plot of Brantford*, 1838 *Plan...In the Neighbourhood of the Town of Brantford and the Mohawk Village*, 1839 *Plan of the Township of Brantford*; Marcus Smith's 1852 *Map of the Town of Brantford*; Tremaine's 1858 *Map of the County of Brant*; the 1875 *Illustrated Historical Atlas of the County of Brant*. The thematic approach was used as a guide to examining aspects of Brantford's past that have contributed to its growth and development, and to determine the ways in which archaeological investigations may provide an enhanced understanding of that past.

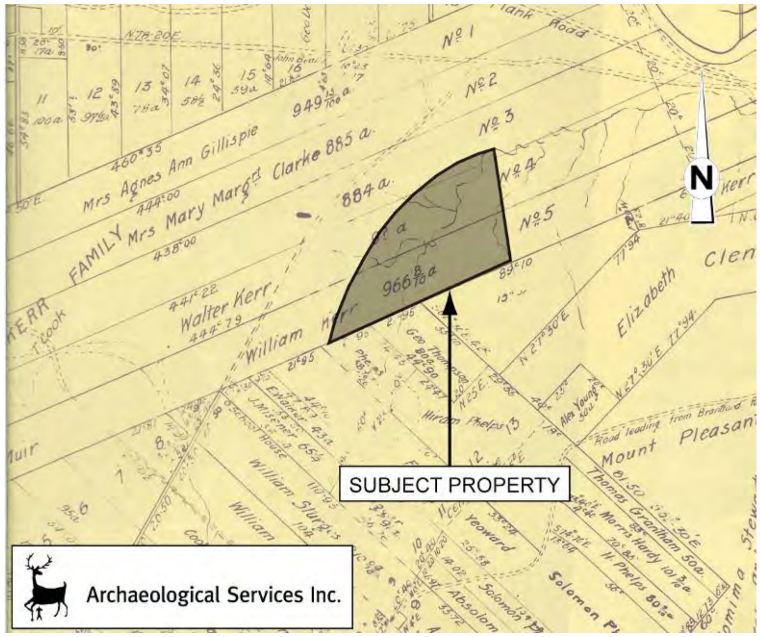

Figure 3: The study area overlaid on the 1839 *Plan of the Township of Brantford.* Note that the boundaries of this study area relative to the nineteenth century map are approximate.

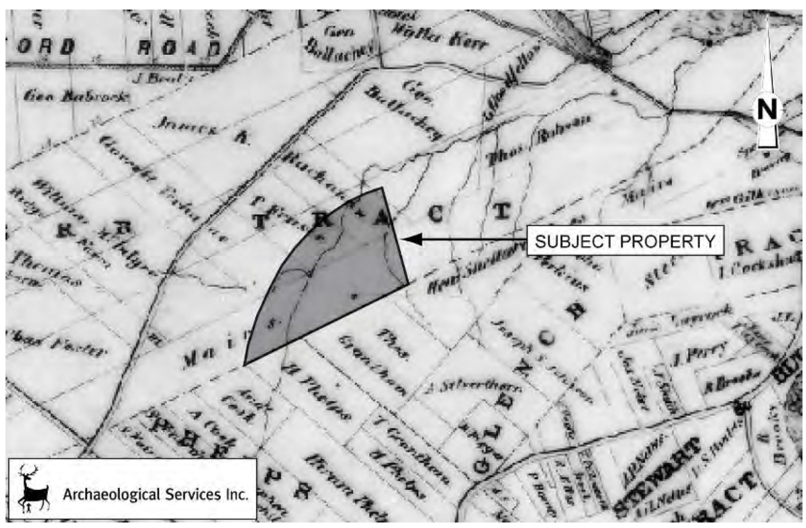

Figure 4: The study area overlaid on the 1858 *Tremaine Map of Brant County.* Note that the boundaries of this study area relative to the nineteenth century map are approximate.

This work did not result in the identification of any specific potential zones for the presence of historic archaeological resources within the present study area. However, it should be noted that this component of the master plan did not entail mapping of individual rural farmsteads depicted on the historic map sources within the project GIS.

For the purposes of this study, therefore, the 1839 *Plan of the Township of Brantford,* the 1858 *Tremaine Map of Brant County* and the 1875 *Illustrated Historical Atlas of Brant County*, the latter of which is the only of the early historic map sources to depict rural farmsteads, were reviewed to determine the potential for the presence of historical farmsteads within the study area (Figure 5). Given the subject lands proximity to water, the location of Shellard's Land, the proximity of the Brantford & Norwich & Port Burwell Rail Road (B&N&P.B.R.R.) and the general nineteenth century development in the area, however, there is potential for the identification of historical Euro-Canadian archaeological remains within the study area. It should also be noted that not all features of interest were mapped systematically in the Ontario series of historical atlases, given that they were financed by subscription, and subscribers were given preference with regard to the level of detail provided on the maps. Moreover, not every feature of interest would have been within the scope of the 1875 *Atlas*.

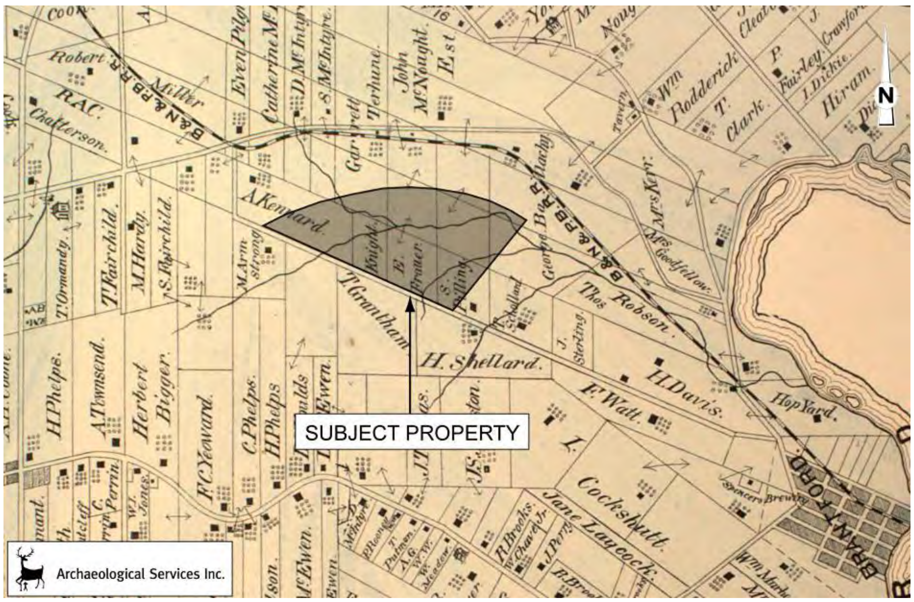

Figure 5: The study area overlaid on the map of Brantford Township (west of the Grand River) in the 1875 *Illustrated Historical Atlas of Brant County*. Note that the boundaries of this study area relative to the nineteenth century map are approximate.

2.4 Archaeological Potential

2.4.1 Precontact Potential

The precontact archaeological potential model developed for the City of Brantford Archaeological Master Plan remains applicable for the secondary planning study area. This model was developed using a GIS to map various sets of information as separate, but complementary layers of spatial data on 1:10,000 scale digital base maps. First, various criteria were mapped and evaluated in order to develop the archaeological potential zone. These included: soils classified by drainage, texture, and capability for agriculture; hydrography, focusing on the Grand River. The archaeological potential zone was then refined by eliminating areas where previous land development had severely disturbed the landscape. Created as a discrete layer of archaeological land integrity, this map was based on the identification of totally disturbed areas using existing land use mapping and visual review of these areas. Basically, the modelling exercise determined that over 85% of all registered and unregistered precontact sites and isolated finds in the City of Brantford may be expected to occur within 150 metres of water, including relict sources. This finding suggested that a buffer zone extending 150 metres from any water source constitutes an acceptable characterization of precontact archaeological site potential (ASI 2006a). The results of previous archaeological surveys within the study area (ASI 1988b) are consistent with this characterization.

In the past decade there has been further insight into the location of archaeological sites on the floodplain of the Grand River and associated cold water streams. D'Aubigny Creek is a cold water creek located along the northeast limits of the study area. Closer to the mouth where the creek enters the Grand River the D'Aubigny Creek site (AgHb-276) was discovered in 2005, during a Stage 2 archaeological assessment of a proposed trunk watermain extending through D'Aubigny Park. Artifacts were found during the test pit survey extending over an area over an area of 15 metres by 25 metres. Further Stage 3 test excavations involved the removal of overburden by Gradall and the excavation of one metre test units. These test units contained buried paleosol and artifacts from four distinct strata. The Stage 4 mitigation continued through block excavation of each of the identified strata, and determined that Strata (5 and 6) were the primary occupation layers. These layers were dated to the Middle Woodland period through AMS ^{14}C dating performed on the botanical remains found in the context of Strata 6. Several other layers, however, revealed diagnostic artifacts dating to the Archaic period. In total, over 1,800 artifacts were recovered indicating a continuous human occupation of the site over a 4, 500 year period (ASI 2006c).

One additional site located on a terrace setting, the Snowhill site (AgHb-239) was discovered during the Stage 2 archaeological assessment of a proposed residential development. A further Stage 3 assessment and Stage 4 excavation was conducted on the Snowhill site due to its' significance (LMA 2000). The Snowhill site yielded Late Paleoindian projectile points dating the earliest occupation of this location to ca. 8,000 B.C. A portion of the Snowhill site area yielded buried paleosol, a black organic soil deposit, representing evidence of the deposition of soils during the intermittent flooding of the Grand River, into a small cold water stream which is adjacent to the site situated approximately 180 metres north of the river (TMHCI 2007). The buried palesol contained the earliest cultural material from the site.

The North of Shellard Neigbourhood and Recreation Plan is situated in a similar environment to where buried paleosols have been identified and there is similar potential for early sites to occur in buried deposits.

2.4.2 *Euro-Canadian Archaeological Potential*

The City of Brantford Master Plan did not specifically address the potential distribution of Euro-Canadian rural farmstead sites. Nevertheless, the majority of early nineteenth century farmsteads (i.e., those which potentially have the most significant resources and whose locations are rarely recorded on nineteenth century maps) are likely to be captured by the basic proximity to the water model outlined above. An added factor, however, is the development of the network of concession roads through the course of the nineteenth century. These transportation routes were loci for Euro-Canadian domestic, commercial, and institutional land use. In addition to the lands within the 150m buffer zone around water, therefore, undisturbed lands that lie within 100 metres of an early settlement road, such as Shellard Lane, and within the same distance of the Brantford & Norwich & Port Burwell Railroad (B&N&P.B.R.R.) are also considered to have potential for the presence of historic archaeological resources.

3.0 STAGE 1 FIELD REVIEW

A field review was conducted by Dr. Andrew Riddle on November 4, 2010 in order to confirm this basic understanding of the archaeological potential of the study area and to determine the degree to which development and landscape alterations may have affected that potential. The weather at the time of the field review was cool and misty.

The overall topography of the land consists of gently rolling agricultural fields (Plates 1-5). D'Aubigny Creek extends along the northeastern limits and two of its tributaries meander across the study area. Along the entire north and west limit of the study area is a former rail line that is now a paved trail. The south side of the study area is Shellard's Lane. To the east of the study area is a residential area that is currently under development.

The fields located in the east portion of the property had been planted in corn and were recently harvested while the fields in the west had been planted in soya bean that had also been recently harvested. The extreme southwestern portion consists of a residence with an adjacent vacant grassed field. There are also wooded areas in the north and hedgerows separating some of the farm fields.

There have been no significant changes to the landscape since the time of the 1988 Stage 2 survey. At the time of the 1988 survey the preparation of the subject lands was completed by means of a soil saving technique. The visibility of the survey in 1988 was hindered due to crop residue on the surface of the fields. These survey conditions are no longer acceptable for archaeological survey and therefore the Stage 2 survey of the study area must be redone in accordance with the current Ministry of Tourism and Culture's Standards and Guidelines for Consulting Archaeologist.

Figure 6: Subject property located on Google Map, accessed November 4, 2010

4.0 CONCLUSIONS AND RECOMMENDATIONS

Stage 1 archaeological assessment of the North of Shellard Neighbourhood and Recreation Plan determined that a total of 23 archaeological sites have been registered within the portion of the study area proposed for development while there are six sites that are registered within the portion of the study area that is to be protected within the Natural Heritage System. A review of the physiography of the study area revealed that D'Aubigny Creek is adjacent to the study area and two of its tributaries flow across the subject lands. A review of the historical atlas maps did not illustrate any historical homesteads within the study area, however, given the proximity to the historically important transportation corridors Shellard's Lane and the B &N & P.B.R.R., the study area is situated within a zone of pre-contact Aboriginal and historical Euro-Canadian archaeological potential.

The current field review found that there have been no significant changes to the landscape since a 1988 assessment of the property.

A Stage 2 archaeological assessment must be carried out within the proposed developable portions of the study area. Previously cultivated land, such as agricultural fields, must be assessed by pedestrian survey: the land should be freshly ploughed and weathered by at least one substantial rainfall before an archaeological field survey can be conducted. Cultivated and weathered fields are optimal for pedestrian survey, since potential visibility of cultural material on the surface is at its highest. The field cannot be surveyed with any crop debris remaining on the surface as the primary concern from an archaeological perspective is that nothing impedes visibility of the soil. The pedestrian survey would be conducted at five metre transect intervals. At least 80 % of the ground surface must be visible. The pattern and intensity of the survey may be adjusted due to variation in site potential.

Areas that cannot be cultivated such as lawns surrounding the existing residences or small wooded or scrub areas must be subject to a test pit survey. Test pits are approximately 30 cm in diameter and are shovel excavated to subsoil allowing for the examination of stratigraphy and the detection of cultural soil horizons. Areas of archaeological potential must be subjected to testing at five metre intervals. Test pit soil must be screened through one quarter inch (6 mm) mesh in order to facilitate artifact recovery. The pattern and intensity of testing may be adjusted, in the course of fieldwork, due to variation in site potential or the results of test pits.

In light of these considerations, the following recommendation is made:

1. Prior to any land-disturbing activities within the study area, a Stage 2 Archaeological Assessment must be conducted in accordance with the 2010 MTC's *Standards and Guidelines for Consultant Archaeologists*.

2. Those sites situated within the Natural Heritage System must be protected from any disturbance.

3. In the event that deeply buried archaeological remains are found on the property during construction activities, the Heritage Operations Unit of the Ministry of Tourism and Culture should be notified immediately.

The following conditions also apply:

- This report is submitted to the Minister of Tourism and Culture as a condition of licensing in accordance with Part VI of the Ontario Heritage Act, RSO 1990, c 0.18. The report is reviewed to ensure that the licensed consultant archaeologist has met the terms and conditions of their archaeological licence, and that the archaeological fieldwork and report recommendations ensure the conservation, preservation and protection of the cultural heritage of Ontario.

- Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the Ontario Heritage Act. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with sec. 48 (1) of the Ontario Heritage Act.

- The Cemeteries Act requires that any person discovering human remains must immediately notify the police or coroner and the Registrar of Cemeteries, Ministry of Small Business and Consumer Services.

- The documentation related to this Archaeological Assessment will be curated by Archaeological Services Inc. until such a time that arrangements for their ultimate transfer to Her Majesty the Queen in right of Ontario, or other public institution, can be made to the satisfaction of the project owner(s), the Ontario Ministry of Tourism and Culture, and any other legitimate interest groups.

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6.0 PLATES


Plate 1: Looking northwest across recently harvested corn field.


Plate 2: View northeast from the old rail line across a portion of the Natural Heritage System.


Plate 3: Looking northeast across gently rolling fields.


Plate 4: View north across recently harvested soya field.


Plate 5: Looking east to the existing housing north of Shellard's Lane

B. Proposed Development Yields

Table 1. Land Use Areas

Land Use	North of Shellard Lane Community + Rec Centre MP	
	Area (ha)	% of Entire Study Area
Low Density Residential (Single-Detached)	11.20	11.9%
Medium Density Residential (Street Townhouse)	1.30	1.4%
High Density Residential (Apartment)	0.37	0.4%
Live-Work Townhouse	1.52	1.6%
Mixed-Use Retail/Residential	2.34	2.5%
Place of Worship	1.50	1.6%
School/Rec Centre/Library Complex (includes surface parking)	3.58	3.8%
Total Net Study Area (ha)	21.81	23.2%
Core Natural Heritage Features	28.49	30.3%
Buffers for Environmental Protection Area (EPA)	10.48	11.1%
EPA Associated Areas	0.48	0.5%
Parks	2.23	2.4%
Storm Water Management Ponds	4.21	4.5%
Sportsfields Area	13.93	14.8%
Steep Slope Area	1.55	1.6%
Public Roads	10.94	11.6%
Total Gross Study Area (ha)	94.12	76.8%

Table 2. Unit and Population by Development Type

	Development Type	**North of Shellard Lane** Community + Rec Centre MP
RETAIL/MIXED-USES	**Population of Employment Generating Uses**	
	Total Area of Retail/Commercial in Study Area (sq.m)	12,147
	Retail/Commercial (persons employed)	162
	Secondary School (persons employed)	60
	Place of Worship (persons employed)	3
	Recreation Centre/Library (persons employed)	25
	Live-Work Townhouse (average 7m units)	
	Land Area (ha)	1.52
	Total Area of Retail/Commercial in Study Area (sq.m)	4,853
	Number of Residential Units	65
	Persons Per Unit (ppu)	2.65
	Number of People	171
	Mixed-Use Building (4 storeys)	
	Land Area (ha)	2.34
	Total Area of Retail/Commercial in Study Area (sq.m.)	7,294
	Density (units/ha)	84
	Number of Residential Units	197
	Persons Per Unit (ppu)	1.72
	Number of People	338
RESIDENTIAL	**Large Lot Single-Detached (average 15m lots)**	
	Land Area (ha)	3.22
	Number of Residential Units	58
	Persons Per Unit (ppu)	3.13
	Number of People	182
	Single-Detached (average 9m lots)	
	Land Area (ha)	7.98
	Number of Residential Units	249
	Persons Per Unit (ppu)	3.13
	Number of People	780
	Townhouses (average 6m units)	
	Land Area (ha)	1.30
	Number of Residential Units	67
	Persons Per Unit (ppu)	2.65
	Number of People	177
	Low-Rise Apartment (4 storeys; average 95 sq.m/unit gross)	
	Land Area (ha)	0.37
	Density (units/ha)	84
	Number of Residential Units	31
	Persons Per Unit (ppu)	1.72
	Number of People	53

Notes/Assumptions:

1 Singles, townhouse, and live-work unit yields were calculated based on street frontage calculations using the following assumptions:

5% of the total frontage was deducted to account for lotting ineficiencies and side yard setback requirements

The yard setbacks considered were:

Front yards	4.5m
Lane based unit rear yard	14.8m
Front-load rear yard	7.5m

2 Apartment unit yields were based on the following net densities:

Mid-Rise Apartment - 84 units/ha

3 In order to calculate population, the following persons/unit ratios were applied:

(as provided by the City of Brantford August 2011)

Single-Detached - 3.13 ppu

Townhouse - 2.65 ppu

Apartment - 1.72 ppu

4 Assumes each live-work unit to be residential above and retail/commercial at-grade.

5. Mixed-Use retail job generation has been assumed at 75sq.mt. per employee.

Grand Total	**North of Shellard Lane** Neighbourhood + Rec Centre MP
Total Land Area (ha) (no environmental & sports fields)	39.67
Total Number of Units	667
Total Number of People + Jobs	1,952
Persons + Jobs Per Hectare (p+j/h) (excluding all environmental, environmental buffers, and sports fields)	**49.2**

Table 3. Unit and Population by Development Type for City Owned Lands Only

	Development Type	North of Shellard Lane Community + Rec Centre MP
RETAIL/MIXED-USES	**Population of Employment Generating Uses**	
	Total Area of Retail/Commercial in Study Area (sq.m)	9,972
	Retail/Commercial (persons employed)	133
	Secondary School (persons employed)	60
	Place of Worship (persons employed)	3
	Recreation Centre/Library (persons employed)	25
	Live-Work Townhouse (average 7m units)	
	Land Area (ha)	0.89
	Total Area of Retail/Commercial in Study Area (sq.m)	2,678
	Number of Residential Units	36
	Persons Per Unit (ppu)	2.65
	Number of People	95
	Mixed-Use Building (4 storeys)	
	Land Area (ha)	2.34
	Total Area of Retail/Commercial in Study Area (sq.m.)	7,294
	Density (units/ha)	84
	Number of Residential Units	197
	Persons Per Unit (ppu)	1.72
	Number of People	338
RESIDENTIAL	**Large Lot Single-Detached (average 15m lots)**	
	Land Area (ha)	4.19
	Number of Residential Units	58
	Persons Per Unit (ppu)	3.13
	Number of People	182
	Single-Detached (average 9m lots)	
	Land Area (ha)	4.43
	Number of Residential Units	155
	Persons Per Unit (ppu)	3.13
	Number of People	485
	Townhouses (average 6m units)	
	Land Area (ha)	1.30
	Number of Residential Units	67
	Persons Per Unit (ppu)	2.65
	Number of People	177
	Low-Rise Apartment (4 storeys; average 95 sq.m/unit gross)	
	Land Area (ha)	0.37
	Density (units/ha)	84
	Number of Residential Units	31
	Persons Per Unit (ppu)	1.72
	Number of People	53

Notes/Assumptions:

1 Singles, townhouse, and live-work unit yields were calculated based on street frontage calculations using the following assumptions:

5% of the total frontage was deducted to account for lotting ineficiencies and side yard setback requirements

The yard setbacks considered were:

Front yards	4.5m
Lane based unit rear yard	14.8m
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2 Apartment unit yields were based on the following net densities:

Mid-Rise Apartment - 84 units/ha

3 In order to calculate population, the following persons/unit ratios were applied:

(as provided by the City of Brantford August 2011)

Single-Detached - 3.13 ppu

Townhouse - 2.65 ppu

Apartment - 1.72 ppu

4 Assumes each live-work unit to be residential above and retail/commercial at-grade.

5. Mixed-Use retail job generation has been assumed at 75sq.mt. per employee.

Grand Total for City Owned Lands Only	**North of Shellard Lane** Neighbourhood + Rec Centre MP
Total Land Area (ha) (no environmental & sports fields)	32.25
Total Number of Units	543
Total Number of People + Jobs	1,551
Persons + Jobs Per Hectare (p+j/h) (excluding all environmental, environmental buffers, and sports fields)	**48.1**

C. Transportation Assessment and Management Report

North Shellard

Neighbourhood + Recreation Plan
City of Brantford

Transportation Assessment and Management Report

September 2011

Poulos Chung

North Shellard

Neighbourhood + Recreation Plan
City of Brantford

Transportation Assessment and Management Report

September 2011

North Shellard

Neighbourhood + Recreation Plan
City of Brantford
Transportation Assessment and Management Report

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Appendices

Appendix A Relevant Figures - Transportation Master Plan
Appendix B Relevant Figures - Amendment No. 144
Appendix C Existing Transit Route Structure and Schedule
Appendix D Figure 6.2 - Master Servicing and Traffic Report 2008
Appendix E Capacity Analysis Calculation

North Shellard

Neighbourhood + Recreation Plan
City of Brantford
Transportation Assessment and Management Report

1. Introduction

In July 2010 the Planning Partnership in association with Poulos & Chung Limited, The Sernas Group, Plan B Natural Heritage Archeological Services Inc. and Their + Curran Architects Inc. were retained by the City of Brantford to produce the North Shellard Neighbourhood + Recreation Plan.

Poulos & Chung Limited participated throughout the planning process including:

- Assistance and input to prepare master plan land use and transportation components;
- Attendance at public workshops and working meetings;
- Preparation of Transportation Assessment and Management Report.

All transportation input and analysis procedures were based upon the provision to:

- Integrate a transportation system consisting of infrastructure which can balance and serve all critical modes of transportation;
- Ensure that sufficient capacity and connections are provided for all modes of transportation such that all travel demands can be satisfactorily served in a calmed and efficient manner;
- Contain the transportation system in an environment that respects urban design objectives, environmental features and municipal development objectives;
- Ensure that strong connections are made to adjacent neighbourhoods and the major attractors and generators of the City including the downtown without any adverse impacts.

The following sections present the important background information used in the preparation of transportation input, detailed analysis conducted, the management plan formulated and the conclusions and recommendations.

2. Basis of Analysis

The Transportation Assessment and Management Report utilized numerous relevant and important sources of information. This included:

- City of Brantford Transportation Master Plan Update, February 2007 by EarthTech;
- Southwest Brantford West of Conklin Secondary Plan, City of Brantford, Master Servicing and Traffic Report, February 2008 by URS;
- Amendment No. 144 to the Official Plan of the City of Brantford;
- Identified Trails and Bikeways Plans;
- Brantford Public Transit services.

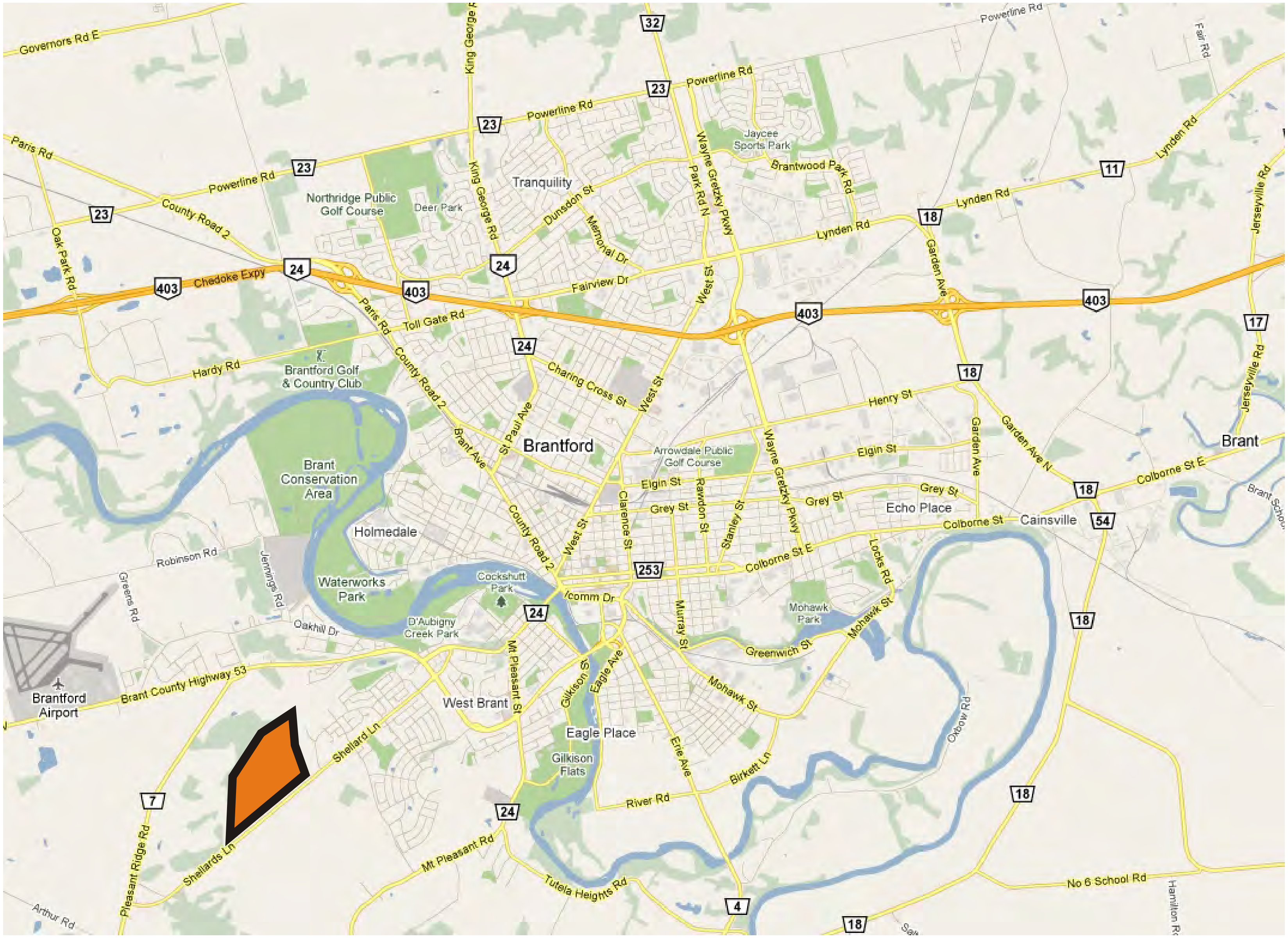
Calculations conducted to determine roadway / intersection levels of service and operating conditions are based upon the "Synchro" Version 6 Software Program by Trafficware Inc.

3. Setting

The North of Shellard Neighbourhood is located in the south west area of the City of Brantford.

The location of the neighbourhood is shown in Figure 1.

The neighbourhood is located north of Shellard Lane and the property boundary is shown in Figure 2.



Poulos & Chung

Legend:

Site Location

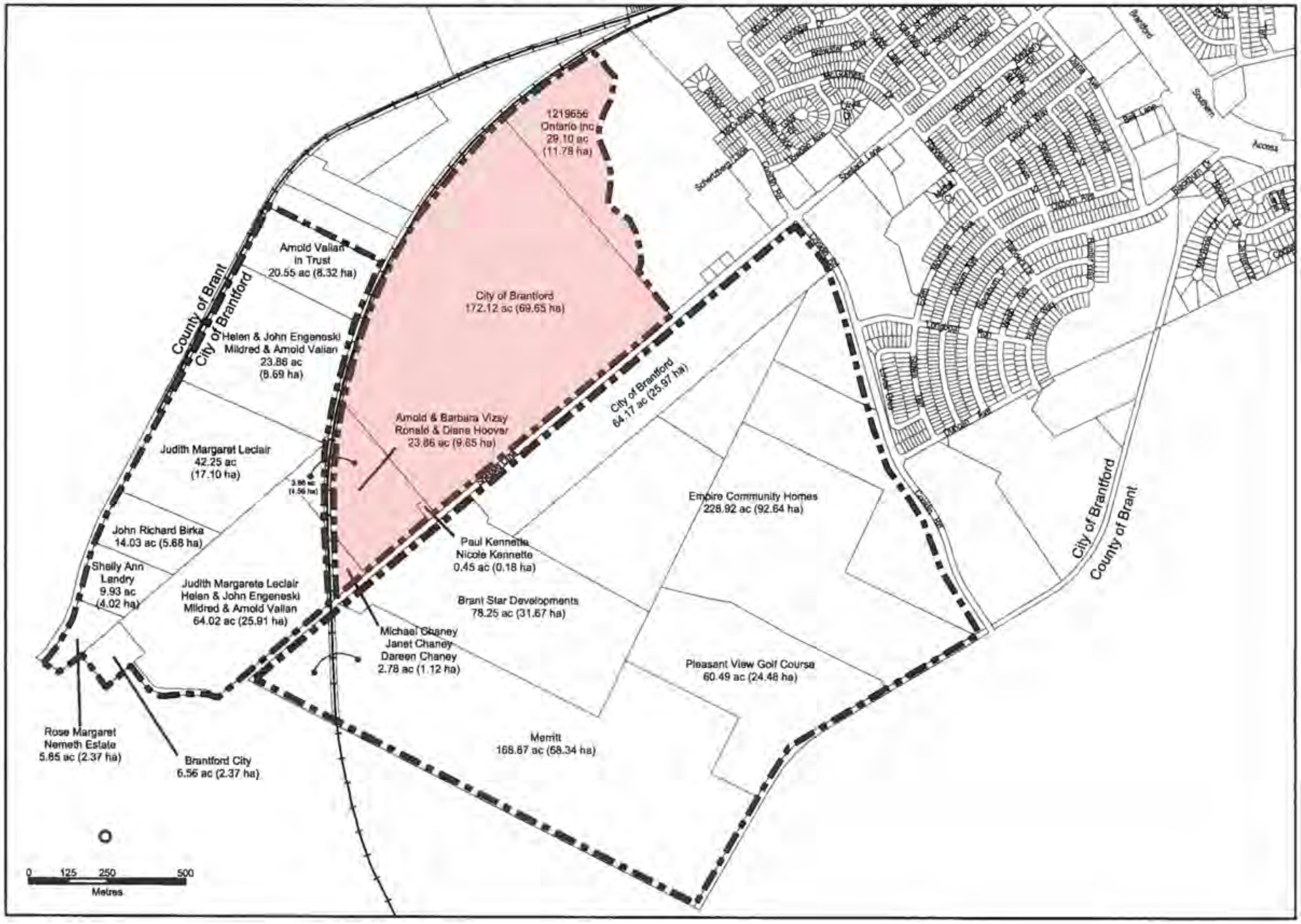
Background Image from Google Maps (2010)

Site Location

Figure 1

10.220 Base A 10/22/10

PROPERTY OWNERSHIP



Poulos Chung

Not to Scale

Property Ownership
Figure 2

10.220 Base E 01/07/2011

4. Guiding Policies, Principles and Context Analysis

4.1 Transportation Master Plan

The Transportation Master Plan has provided clear strategic direction to reduce peak hour auto demands as opposed to maintaining current mode shares. This neighbourhood can help to achieve this strategic direction, formulating a transportation system and integrated physical components to:

- Increase the share of trips made by walk / bike mode;
- Increase the share of trips made by transit;
- Encourage travel demand management measures through land use formations and use designations.

Other relevant direction obtained from the Transportation Master Plan is presented in Appendix A.

The relevant information is summarized in the following Figures:

- A1 – Transit improvement plans;
- A2 – Designated truck routes. Shellard Lane is designated as a truck route. It is noted that the existing truck route designation extends to Conklin Road. As the planned improvements to Shellard Lane occur, the truck designation will be extended to the western limits of the community;
- A3 – Roadway Classifications. Shellard Lane is designated as a Minor Arterial Road;
- A4 – Recommended City wide Road Network improvements;
- A5 – Medium Term Road Network Priorities 2012 to 2016;
- A6 – Road Network Priorities 2017 to 2021;
- A7 – Recommended Cycling and Trail Network Plan;
- A8 – Immediate and Medium Walking / Cycling Network Priorities;
- A9 – Long Term Walking / Cycling Network Priorities 2017 to 2021;
- A10 – Recommended Cycling and Trail Network Plan – Southwest.

All of the above relevant information was used in the planning process and analysis procedures.

4.2 Amendment No. 144 to the Official Plan of the City of Brantford

Amendment No. 144 provided further detail for the North Shellard Neighbourhood.

Relevant information is presented in Appendix B. The Figures presented include:

- B1 – Schedule 'C' identifying potential land use formations;
- B2 – Schedule "D" identifying the primary road classifications;
- B3 - presenting typical cross-section information for Arterial Road, Major Collector Road and Minor Collector Road.

4.3 Existing Transit

The project site is not currently serviced by transit. The closest transit service circulates on Shellard Lane up to McGuiness Drive. This route services the Flanders Drive and McGuiness Drive neighbourhoods (both just east of the project site) 7 days a week.

Figure 3 shows the route and its schedule.

Although this assessment recommends a route pattern and bus stops, Brantford Transit will have to be consulted to determine an appropriate route to service the area. Current policies require that the planned development place higher densities along collectors to support and encourage transit usage. This consultation and implementation process can commence once the detailed plans of subdivision become available.

The city has developed modal split goals which are as follows:

Table 1
Target Modal Split Levels

Mode of Travel	Existing Mode Split (%)	2016 Target Mode Split (%)	2031 Target Mode Split (%)
Auto (Driver & Passenger)	90%	87%	83%
Transit	3%	4%	6%
Walk/Cycle	6%	8%	10%
Other	1%	1%	1%
Total	100%	100%	100%

The table (which is from the City's Transportation Master Plan) shows that the City wants to double its transit modal split and nearly double its Walk/Cycle modal split by 2031.

Appendix C contains the existing transit route structure.

Figures C1 and C2 identify the route pattern and the regular schedule.

Legend:

Transit Route

Schedule:

Mon - Sat: 6am - 12:30am : Every 30 minutes
Sun: 8:30am - 5:30pm : Every 1 Hour

Background Image from Google Maps (2010)

Poulos & Chung

Existing Transit Service
Figure 3

10.220 Base A 10/22/10

4.4 Planned Area Roadway Improvements and Additions

As identified in the Transportation Master Plan Shellard Lane is scheduled for improvement.

Figure 4 illustrates the staging of the planned improvement. No other area roads are planned for improvements and additions.

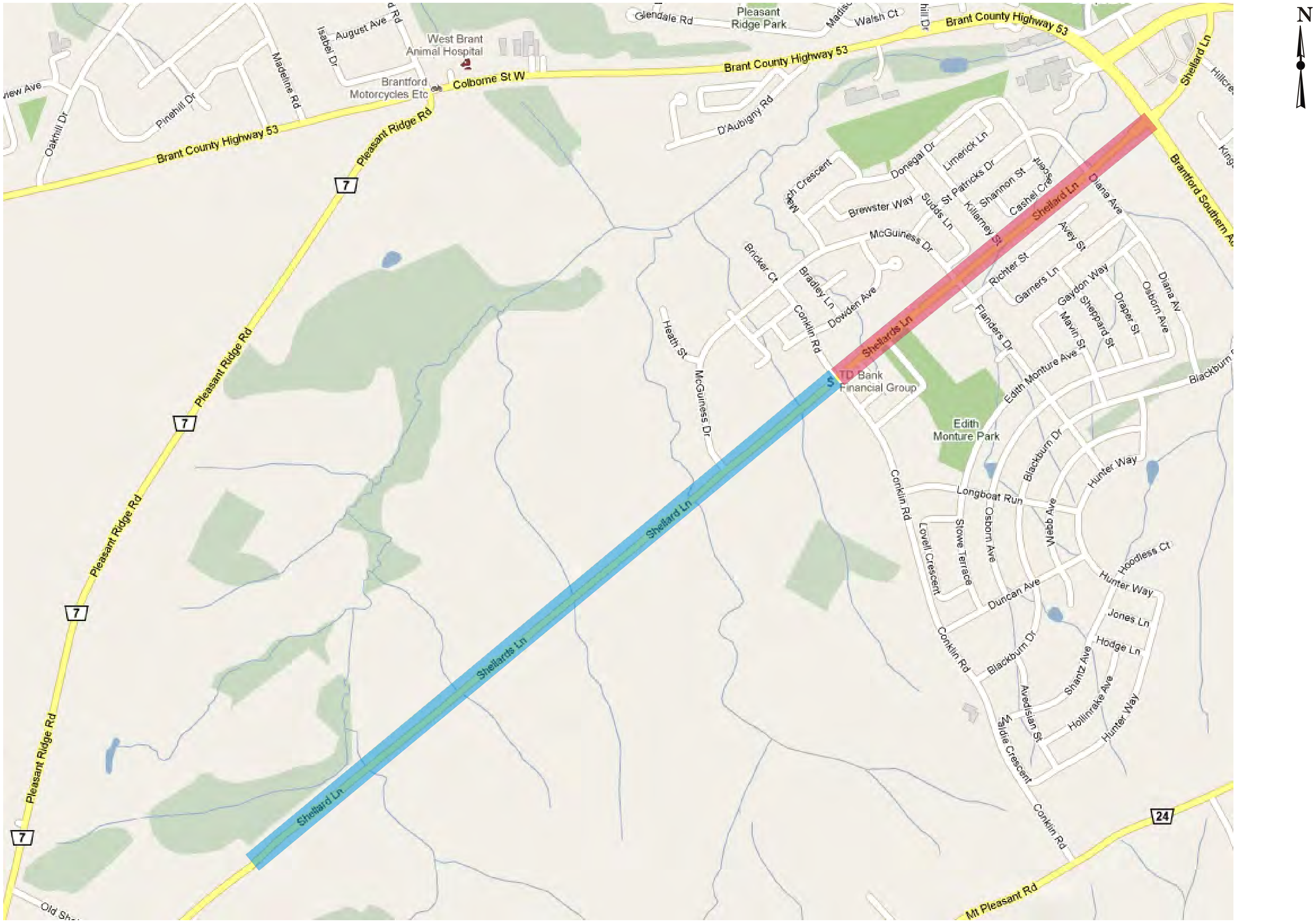
It is evident that the timing of the proposed widening is also dependent upon the staging and construction build out of the planned land uses north and south of Shellard Lane. The need and justification for the planned widening is mostly based upon the travel demands generated by the planned land uses. As such the timing and how far west the widening to four lanes is to occur is mostly dependent upon these land uses.

4.5 Existing Area Traffic Volumes

The Southwest Brantford West of Conklin Secondary Plan, City of Brantford, Master Servicing and Traffic Report, February 2008 by URS provided existing traffic information for Shellard Lane.

Figure 5 presents the existing roadway a. m. and p. m. peak hour vehicle turning movements for a typical weekday which were extracted from this report. The summary analysis containing overall level of service, vehicle delay and volume to capacity ratio is presented by intersection.

The analysis indicates that Shellard Lane including the key intersections based upon the existing lane configuration can satisfactorily serve existing vehicle flow demands.



Legend:

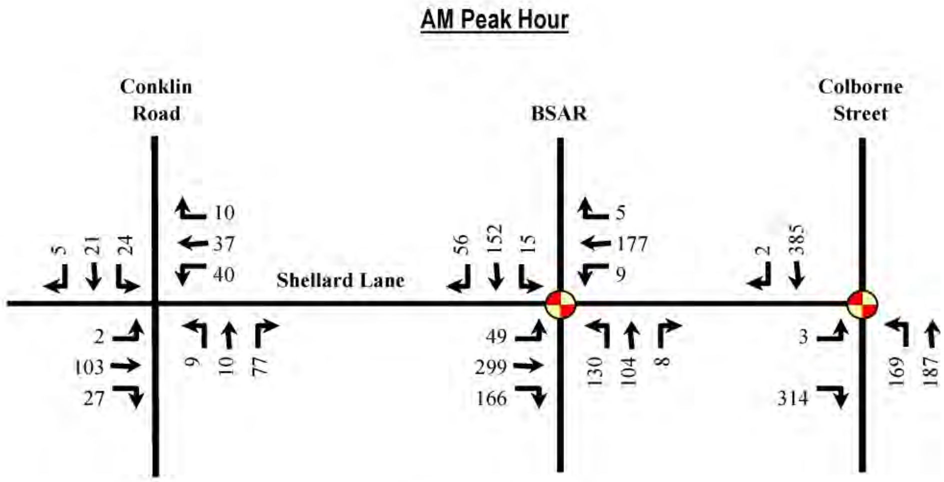
Shellard Lane is currently a 2 lane roadway (and designated truck route)

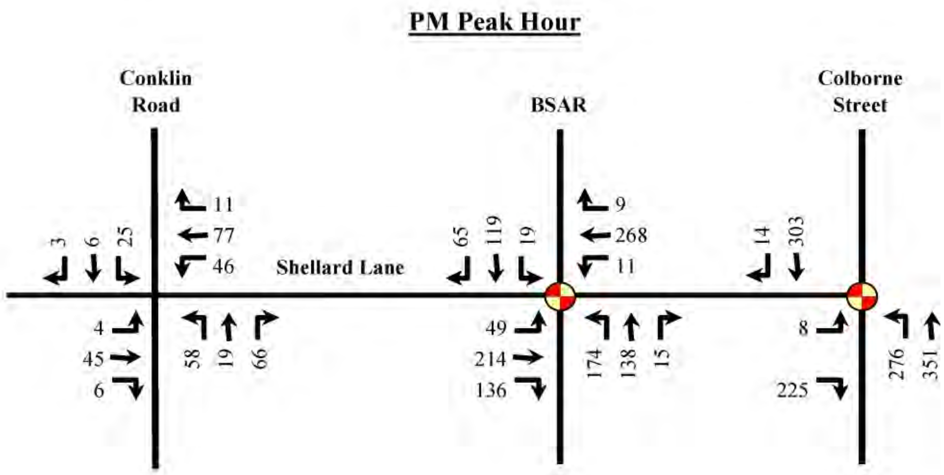
Widen Shellard Lane to 4 lanes (to be completed between 2012 & 2016)

Widen Shellard Lane to 4 lanes (to be completed between 2017 & 2021)

Planned Road Improvements
Figure 4

10.220 Base A 10/22/10





Intersection	AM Peak (LOS, Delay, V/C)	PM Peak (LOS, Delay, V/C)
Shellard/Conklin	B, 12, 0.09	B, 11, 0.06
Shellard/BSAR	B, 19, 0.32	B, 19, 0.33
Shellard/Colborne	B, 17, 0.24	A, 9, 0.32

Poulos & Chung

Note: This figure is taken from the February 2008 report entitled 'SW Brantford W. of Conklin Secondary Plan- Master Servicing & Traffic Report' and has been modified by Poulos & Chung Limited. The volumes shown are from the year 2006.

Existing Traffic Conditions along Shellard Lane

Figure 5

5. North of Shellard Lane Community + Recreation Master Plan

5.1 Community Statistics

The North of Shellard Lane Community + Recreation Centre Master Plan is shown in Figure 6.

Figure 7 presents the community statistics.

5.2 Transportation Foundation

The North of Shellard Lane Community + Recreation Centre Master Plan effectively and efficiently incorporates all transportation policies, principles and directions.

The transportation foundation is described under the following headings:

<u>Roads</u>

The roadway network incorporates:

- A hierarchy of internal roads capable of efficiently providing satisfactory capacities to serve all critical modes in a calmed and safe manner. Internal roads contain appropriate geometric conditions and rights-of-way;

- Access / intersection locations which are strategically aligned and spaced to intersect with the planned land uses on the south side of Shellard Lane designed to provide maximum connectivity between communities and ability to install appropriate traffic control devices including where necessary traffic signals;

- Three access / intersection locations ‘A’, ‘B’ and ‘C’ located with sufficient spacing to permit the installation of traffic signals and maximum connectivity with the land uses to the south. Intersection ‘ C` ’ has been situated as a ‘T’ intersection with southbound stop control device to provide additional accessibility to the Recreation Centre and the outdoor sports fields.

<u>Transit</u>

The ability to introduce transit effectively and efficiently:

- Transit can circulate within the Community on the minor collector road which connects Intersections ‘B’ and ‘C’, further;

- The majority of the community including the mixed use higher density concentrated at the Street ‘A’ intersection and the institutional uses including religious, secondary and recreation activities are all within an approximate 300 meter walk of Shellard Lane. This implies that very short walking distances for any transit service that evolves to serve the area north and south of Shellard Lane, in effect;

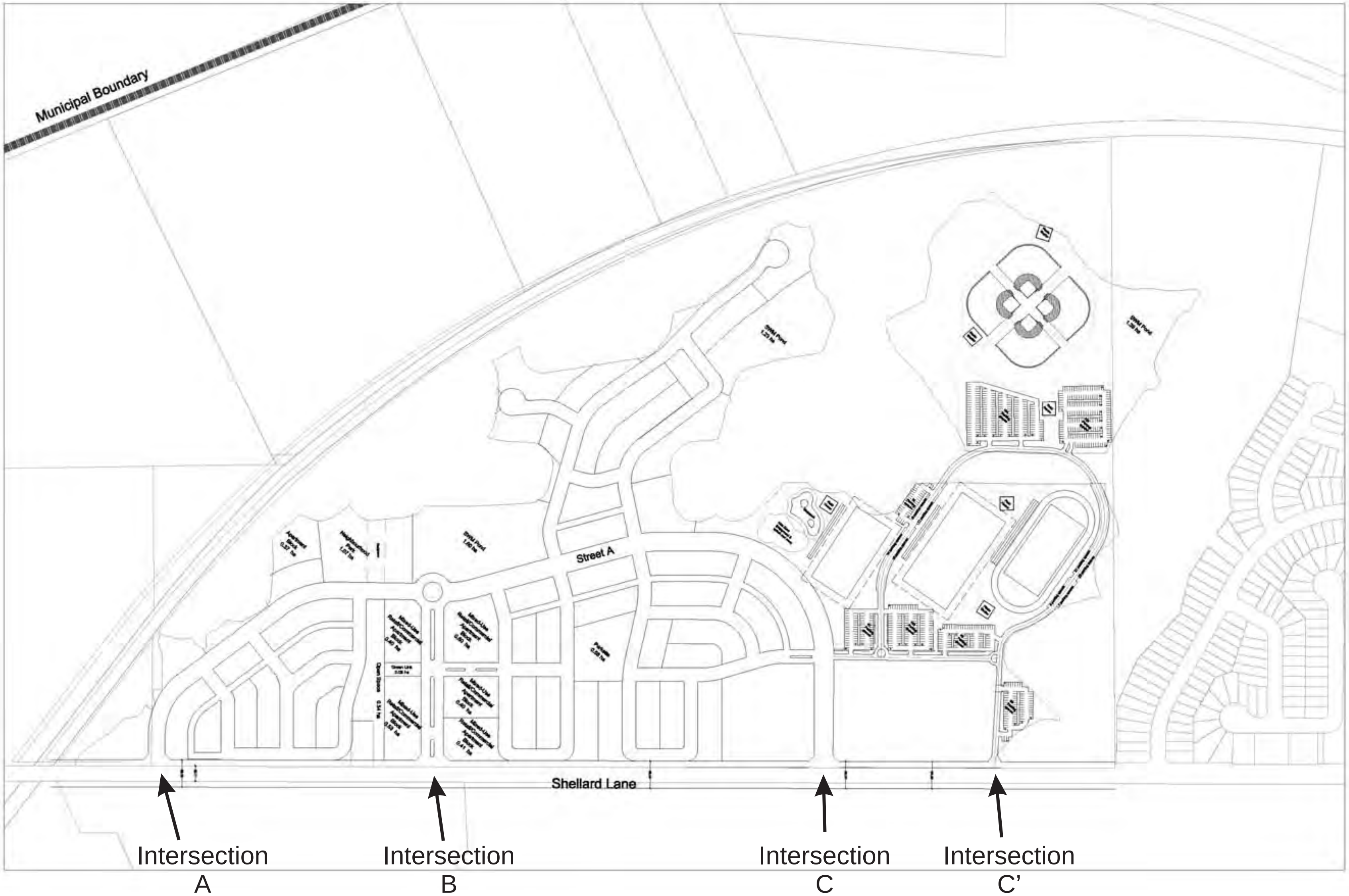
- With transit on the internal collector road the entire community is within a five (5) minute walk of transit.

Pedestrians and Bicyclists

The ability to encourage walking and bicycling is effective and visible:

- All of the identified trails and paths have been incorporated within the master plan;

- Additional off road as well as on road connections have been brought forth to achieve direct and efficient connections to the major attractors and generators



Not to Scale

Poulos Chung

Site Plan
Figure 6

10.220 Base C 09/17/11

Preferred Plan | Development Statistics

The Planning Partnership | September 9, 2011

Table 1. Land Use Areas

Land Use	North of Shellard Lane Community + Rec Centre MP	
	Area (ha)	% of Entire Study Area
Low Density Residential (Single-Detached)	11.20	11.9%
Medium Density Residential (Street Townhouse)	1.30	1.4%
High Density Residential (Apartment)	0.37	0.4%
Live-Work Townhouse	1.52	1.6%
Mixed Use Retail/Residential	2.34	2.5%
Place of Worship	1.50	1.6%
School/Rec Centre/Library Complex (includes surface parking)	3.58	3.8%
Total Net Study Area (ha)	**21.81**	**23.2%**
Core Natural Heritage Features	28.49	30.3%
Buffers for Environmental Protection Area (EPA)	10.48	11.1%
EPA Associated Areas	0.48	0.5%
Parks	2.23	2.4%
Storm Water Management Ponds	4.21	4.5%
Sportsfields Area	13.93	14.8%
Steep Slope Area	1.55	1.6%
Public Roads	10.94	11.6%
Total Gross Study Area (ha)	**94.12**	**76.8%**

Table 2. Unit and Population by Development Type

	Development Type	North of Shellard Lane Community + Rec Centre MP
RETAIL/MIXED-USES	**Population of Employment Generating Uses**	
	Total Area of Retail/Commercial in Study Area (sq.m.)	12,147
	Retail/Commercial (persons employed)	162
	Secondary School (persons employed)	60
	Place of Worship (persons employed)	3
	Recreation Centre/Library (persons employed)	25
	Live-Work Townhouse (average 7m units)	
	Land Area (ha)	1.52
	Total Area of Retail/Commercial in Study Area (sq.m.)	4,853
	Number of Residential Units	65
	Persons Per Unit (ppu)	2.65
	Number of People	171
	Mixed-Use Building (4 storeys)	
	Land Area (ha)	2.34
	Total Area of Retail/Commercial in Study Area (sq.m.)	7,294
	Density (units/ha)	84
	Number of Residential Units	197
	Persons Per Unit (ppu)	1.72
	Number of People	338
RESIDENTIAL	**Large Lot Single-Detached (average 15m lots)**	
	Land Area (ha)	3.22
	Number of Residential Units	58
	Persons Per Unit (ppu)	3.13
	Number of People	182
	Single-Detached (average 9m lots)	
	Land Area (ha)	7.98
	Number of Residential Units	249
	Persons Per Unit (ppu)	3.13
	Number of People	780
	Townhouses (average 6m units)	
	Land Area (ha)	1.30
	Number of Residential Units	67
	Persons Per Unit (ppu)	2.65
	Number of People	177
	Low-Rise Apartment (4 storeys; average 95 sq.m/unit gross)	
	Land Area (ha)	0.37
	Density (units/ha)	84
	Number of Residential Units	31
	Persons Per Unit (ppu)	1.72
	Number of People	53

Notes/Assumptions:

1 Singles, townhouse, and live-work unit yields were calculated based on street frontage calculations using the following assumptions:

5% of the total frontage was deducted to account for lotting inefficiencies and side yard setback requirements

The yard setbacks considered were:

Front yards 4.5m
Lane based unit rear yard 14.0m
Front-load rear yard 7.5m

2 Apartment unit yields were based on the following net densities:

Mid-Rise Apartment - 84 units/ha

3 In order to calculate population, the following persons/unit ratios were applied

(as provided by the City of Brantford August 2011)

Single-Detached - 3.13 ppu
Townhouse - 2.65 ppu
Apartment - 1.72 ppu

4 Assumes each live-work unit to be residential above and retail/commercial at grade

Grand Total	North of Shellard Lane Neighbourhood + Rec Centre MP
Total Land Area (ha) (no environmental & sports fields)	39.67
Total Number of Units	667
Total Number of People + Jobs	1,952
Persons + Jobs Per Hectare (p+j/h) (excluding all environmental, environmental buffers, and sports fields)	**49.2**

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Development Statistics
Figure 7

10.220 Base F 09/17/11

6. Transportation Assessment

6.1 Vehicle Generation, Distribution and Assignment

The determination of vehicle trips generated by The North of Shellard Lane Community + Recreation Centre Master Plan is based upon the 8th Edition Trip Generation Manual published by the Institute of Transportation Engineers.

Appropriate land use codes were selected for the land use types and the identified vehicle trip generation rate was applied.

Figure 8 presents the resultant number of vehicle trips generated by each of the land use types during the typical weekday roadway a. m. and p. m. peak hours.

It is understood that the planned community has the potential to reduce significantly the number of vehicle trips generated through the travel demand management measures that will be available. This includes increased bicycle usage, increased transit usage and synergy created between the mixed land uses. The ability to factor in reduction rates was not applied because the overall community is not large and further reducing of already low vehicle flows will not materially impact the required physical transportation infrastructure.

The distribution applied to the community vehicle trips generated is shown in Figure 9. The distribution and resultant assignment is based upon the characteristics identified in the Southwest Brantford West of Conklin Secondary Plan, City of Brantford, Master Servicing and Traffic Report, February 2008 by URS.

The assignment of the North of Shellard Lane Community + Recreation Centre Master Plan traffic flows during the typical weekday roadway a. m. and p. m. peak hour is shown in Figure 10.

6.2 Background Traffic Volumes

The Southwest Brantford West of Conklin Secondary Plan, City of Brantford, Master Servicing and Traffic Report, February 2008 by URS was used to determine background traffic flows on Shellard Lane.

Shellard Lane is an existing two lane road with one lane of traffic in each direction of travel. The posted speed limit is 50 kilometers per hour.

The URS study incorporated:

- Traffic flows from other planned area developments;
- An increase in background traffic of one (1) percent per year to the analysis horizon year of 2016;

Development traffic flows assigned to the roadway network from the planned uses north and south of Shellard Lane.

Vehicle Trip Estimates - North of Shellard 10.220

ITE Trip Generation Rates

Land Use	ITE Code	Units	Weekday AM Peak Hour			Weekday PM Peak Hour		
			In	Out	Total	In	Out	Total
Low-rise Condo	231	dwellings	0.17	0.50	0.67	0.45	0.33	0.78
Condo/Townhouse	230	dwellings	0.07	0.37	0.44	0.35	0.17	0.52
Single-Family Detached	210	dwellings	0.19	0.56	0.75	0.64	0.37	1.01
Specialty retail Centre	814	1000sf GFA	0.63	0.40	1.03	1.19	1.52	2.71
Church **(1)**	560	Seats						
Daycare **(1)**	565	Students	0.42	0.38	0.80	0.39	0.43	0.82
Library	590	Employees	0.70	0.30	1.00	2.19	2.57	4.75
HighSchool	530	Students	0.28	0.13	0.41	0.07	0.07	0.14
Recreation Centre	495	1000sf GFA	0.99	0.63	1.62	0.54	0.91	1.45

Note 1 : Wordship Services are typical held outside of the roadway peak hours.
It is assumed that day care serices will be provided on site and included in the trip estimated

Trip Generation

Land Use	Units	# of Units	Weekday AM Peak Hour			Weekday PM Peak Hour		
			In	Out	Total	In	Out	Total
Low-rise Apt		31	5	16	21	14	10	24
Live/Work Townhouse		65	5	24	29	23	11	34
MU-res		197	15	72	87	69	34	102
TownHouse		67	5	24	29	23	11	35
Detached (large lot)		58	11	33	44	37	22	59
Detached		249	47	140	187	158	93	251
Total residential		**667**	**87**	**308**	**396**	**324**	**181**	**505**
Retail	1000sf	130.7	82	53	135	156	198	354
Daycare (1)	Students	50	21	19	40	19	22	41
Library	Employees	8	6	2	8	17	21	38
HighSchool	Students	1000	283	127	410	66	74	140
Recreation Centre	1000sf	23.5	23	15	38	13	21	34
Total (Lib/HS/Rec)			312	144	456	96	116	212
Grand Total			**502**	**524**	**1026**	**595**	**518**	**1113**

Poulos Chung

Vehicle Trip Generation - Typical Weekday Roadway AM and PM Peak Hours
Figure 8

Region or Zone of Trip Destination	Number of trips	% of Total trips
Toronto	43	1.4%
Durham	0	0.0%
York	0	0.0%
Peel	38	1.2%
Halton	43	1.4%
Hamilton	149	4.8%
Niagara	0	0.0%
Waterloo	168	5.5%
Guelph	0	0.0%
Wellington	0	0.0%
Orangeville	0	0.0%
Barrie	0	0.0%
Simcoe	0	0.0%
Kawartha Lakes	0	0.0%
Peterborough City	0	0.0%
Peterborough	0	0.0%
Orillia	0	0.0%
Dufferin	0	0.0%
Outside	**441**	**14.3%**
CZ-1	644	20.9%
CZ-2	402	13.0%
CZ-3	256	8.3%
CZ-4	22	0.7%
CZ-5	408	13.2%
8917	0	0.0%
8920	149	4.8%
8936	85	2.8%
8937	149	4.8%
8939	0	0.0%
8945	40	1.3%
8946	0	0.0%
8948	43	1.4%
Brantford	**2198**	**71.3%**
8950	170	5.5%
8951	0	0.0%
8953	20	0.6%
8954	43	1.4%
8955	43	1.4%
8956	0	0.0%
8959	0	0.0%
8960	102	3.3%
Brant County	**378**	**12.3%**
External	**64**	**2.1%**
TOTAL	**3081**	**100.0%**

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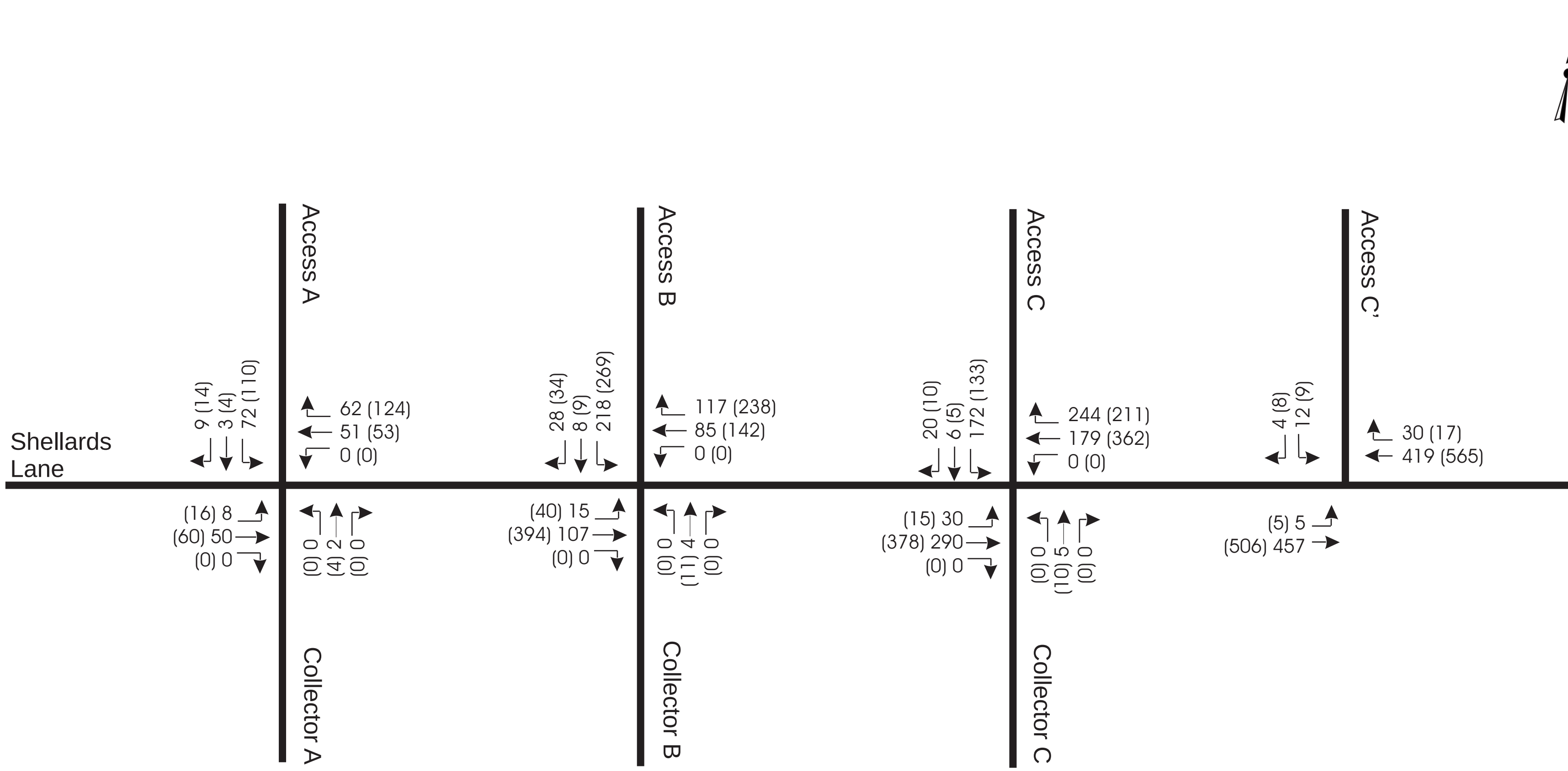
Vehicle Trip Distribution
Figure 9



Legend

XX (YY): AM (PM) Peak Hour Volumes

Not to Scale

Poulos Chung

Site Traffic - North of Shellards Lane Community + Recreation Centre
AM & PM Peak Hour Volumes
Figure 10

10.220 Base C 07/18/11

Figure 6.2 in the URS Study summarized the total 2016 roadway a. m. and p. m. peak hour traffic assignments on Shellard Lane.

Poulos & Chung Limited used this information as the basis of analysis. The critical adjustment to complete this assessment involved subtracting out the forecast traffic flows from the north side of Shellard Lane.

The resultant 2016 background traffic flows is shown in Figure 11.

6.3 Total Vehicle Demands

The total vehicle demands assessed in this report were determined by adding the North of Shellard Lane Community + Recreation Centre Master Plan traffic flows (Figure 10) to the 2016 background traffic flows (Figure 11).

The resultant total 2016 traffic flows assessed are shown in Figure 12.

6.4 Impact Assessment

It is noted that the North Shellard Lane Community + Recreation Centre Master Plan contains Institutional, community centre / recreational uses and a High School. The typical peak hour generation characteristics of these uses are used in the analysis. It is noted however, that that the Community Centre and recreational uses will have peak hours outside of the weekday roadway peak hours. The peak vehicle activity will likely occur on weekday evenings and on weekend days when background traffic flows are lower.

Figure 13 illustrates the Shellard Lane traffic lane configuration and traffic control devices used in this analysis. The configuration and controls are taken from the URS study. Also shown in this Figure are the recommendations coming forth from this study. The new lane configurations and traffic control devices recommended at Access ‘A’, ‘B’, ‘C’ and ‘C`’.

Intersection levels of service, vehicle delay and volume to capacity ratios were determined for each critical Shellard Avenue intersection.

A summary of the analysis results is presented in Figure 14. The detailed calculations sheets are presented in Appendix D.

The summary results show good operating conditions during both roadway peak hours.

Although the Transportation Master Plan identifies the widening of Shellard Lane to four lanes with two lanes of traffic in each direction, the required Environmental Assessment study will determine the need and justification. The Environmental Assessment Study will also confirm the right-of-way, although it is anticipated to be thirty-six (36) meters.

Our interpretation of the 2016 forecast traffic flows leads us to conclude that:

- Two lanes on Shellard Lane with one lane of traffic in each direction of travel west of Conklin Road could provide sufficient capacity to serve forecast traffic flows. The cross-section would be complemented by exclusive vehicle left turn lanes at each of the intersections providing access to the north side and south side land uses;

- It is appropriate to consider the installation of signal traffic control devices at the Street 'B' and Street 'C' intersections. This is recommended because the traffic lights would assist pedestrian flows to and from the Community Centre / recreational uses and the mixed use development on Street 'B", as well as vehicle flows. Although the Street "A" intersection appears to work well with stop sign controls it is recommended that consideration be given to protecting for the introduction of traffic signal control devices.

6.5 Transit

Brantford Transit is expected to provide incremental transit services matching the rate of development both on the north and south side of Shellard Lane.

It is understood that Brantford Transit will ultimately determine the routing pattern and frequency of service for this area. For the purposes of this assessment it was assumed that:

- Transit would proceed westerly along Shellard Lane and enter the North of Shellard Lane Community at the Street 'C' intersection;

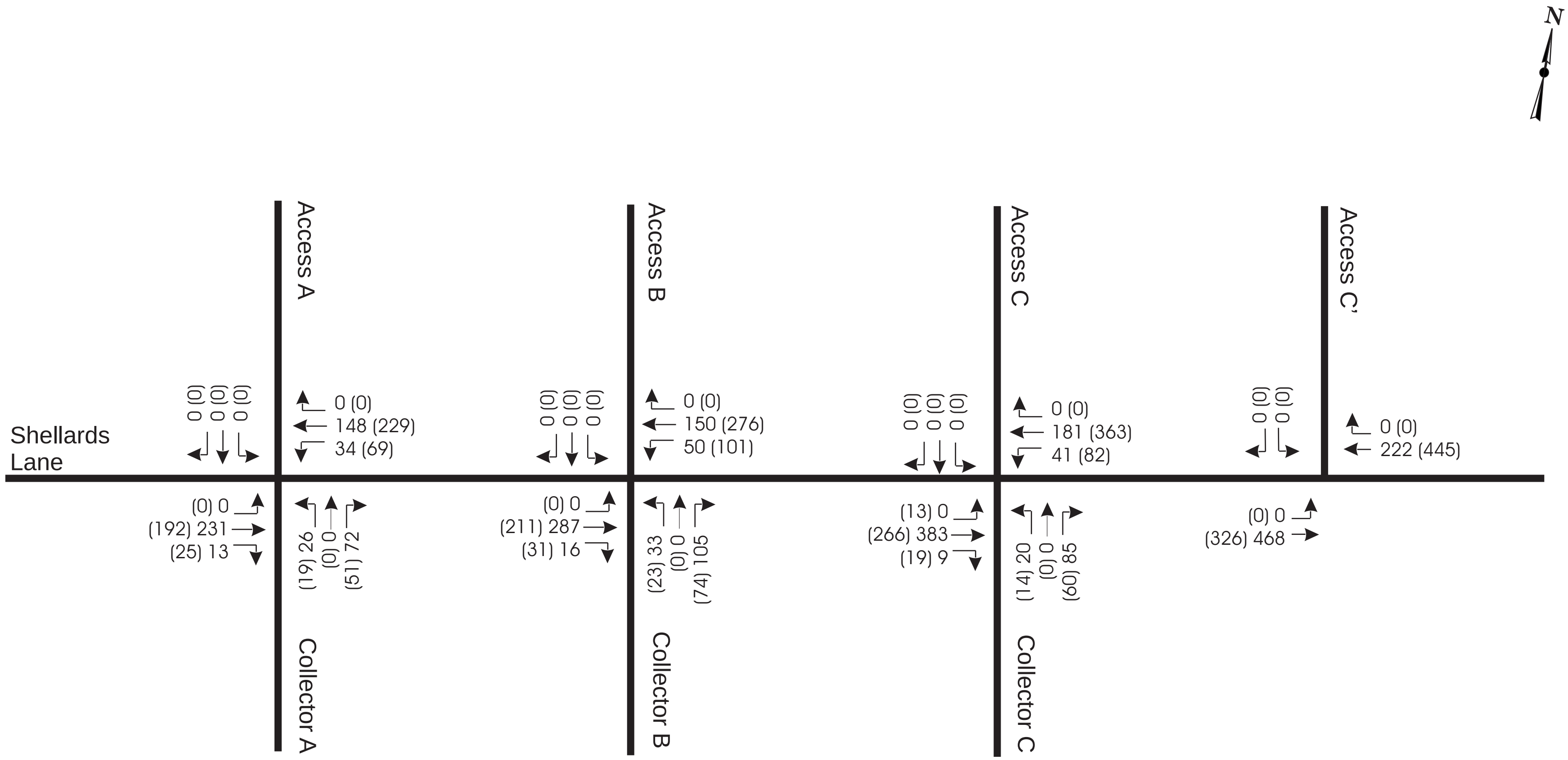
- Transit would then follow the internal minor collector road through the community and exit at the Street 'B' intersection, then;

- Then transit could either turn onto Shellard Lane and then go easterly back towards the downtown, or;

- It could go southerly into the south Shellard Lane land uses and exit back onto Shellard Lane at the Street C intersection. The reason this routing option is provided is to recognize the importance of providing community access to the High School and Community Centre / recreational land uses.

Figure 15 illustrates a potential route pattern along with suggested transit stops. The transit stops have been strategically placed to service the High School, Community Centre / recreational facilities, residential areas and retail / commercial / mixed uses.

It is evident that the entire North of Shellard Lane Community + Recreation Centre lands are within a 300 to 400 meter walk of transit.



Legend

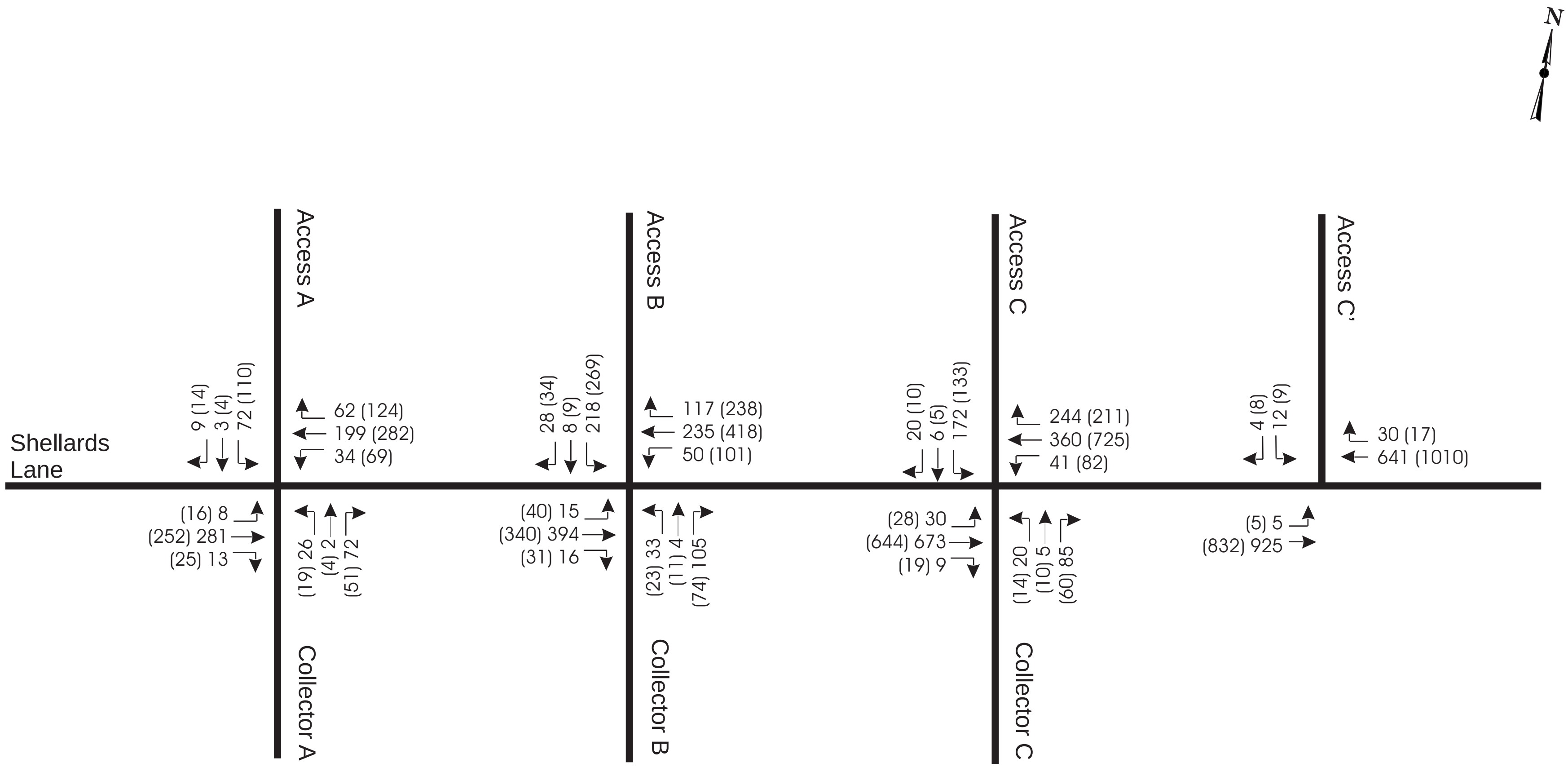
XX (YY): AM (PM) Peak Hour Volumes

Not to Scale

Poulos Chung

2016 Background Traffic - Flows Excluding North Side Land Uses
AM & PM Peak Hour Volumes
Figure 11

10.220 Base C 07/18/11



Legend

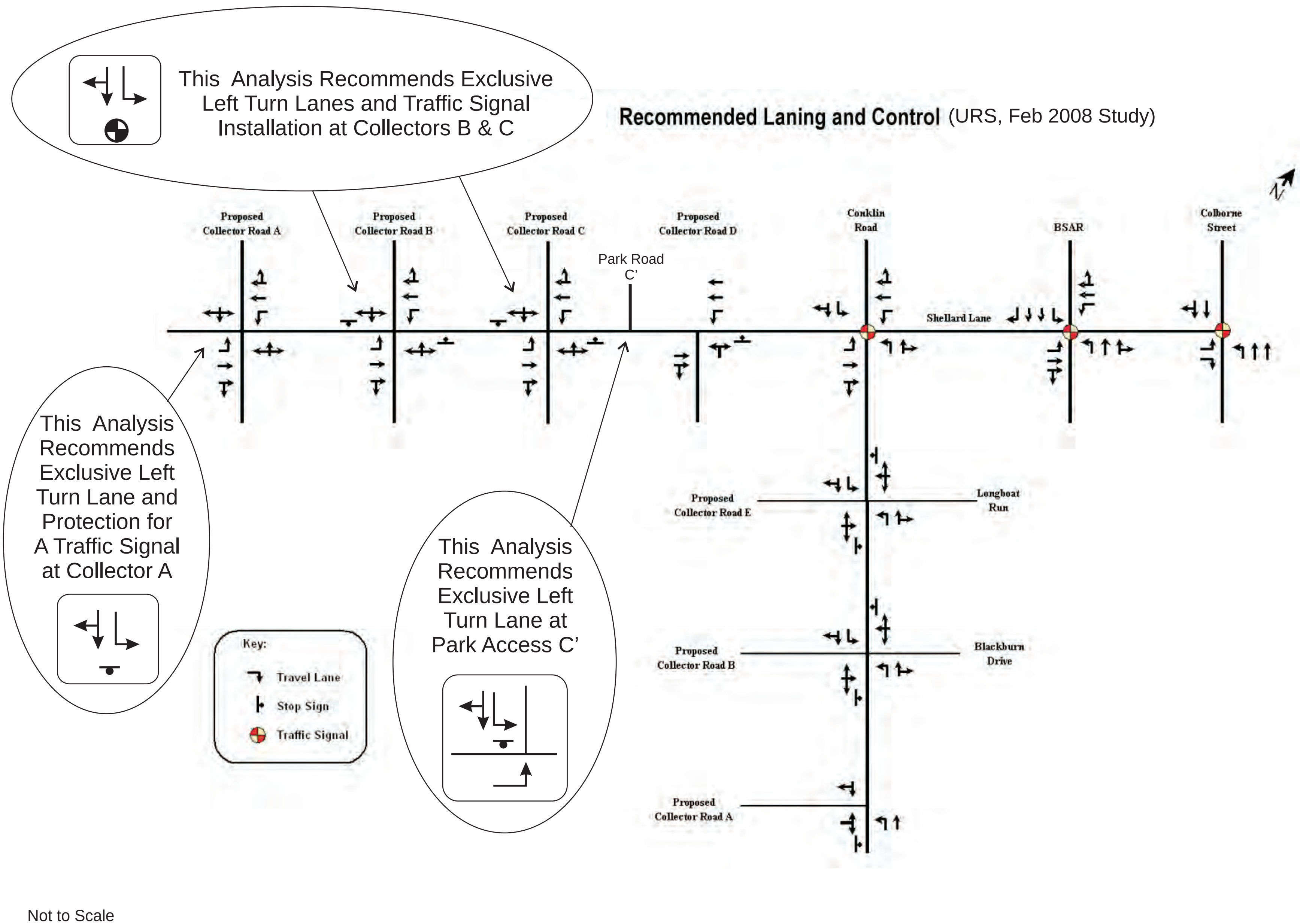
XX (YY): AM (PM) Peak Hour Volumes

Not to Scale

Poulos Chung

Total 2016 Horizon Year Traffic Flows
AM & PM Peak Hour Volumes
Figure 12

10.220 Base C 07/18/11



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Source: City of Brantford
Southwest Brantford West of Conklin Secondary Plan
Master Servicing and Traffic Report
by URS (Feb 2008)

Recommended Laning and Control
Figure 13

Levels of Service / Vehicle Delays (Seconds) / Volume over Capacity (V/C) Ratios
(Critical Movements for V/C => 0.85)

AM

Intersection	2016 Background Traffic	2016 Total Traffic	
		No Improvement	Improvement
	No Signal	No Signal	With Signal
Shellard Ln. /Access A/Collector A	B (12)	C (18)	B (10) 0.19
Shellard Ln. /Access B/Collector B	B (14)	F (86)	B (16) 0.39
Shellard Ln. /Access C /Collector C	C (15)	F (240)	B (11) 0.43
Shellard Ln. /Park Access C'	NA	D (28)	D (28)

PM

Intersection	2016 Background Traffic	2016 Total Traffic	
		No Improvement	Improvement
	No Signal	No Signal	With Signal
Shellard Ln. /Access A/Collector A	B (14)	D (30)	B (11) 0.26
Shellard Ln. /Access B/Collector B	C (16)	F (569)	C (21) 0.41
Shellard Ln. /Access C /Collector C	C (17)	F (641)	B (11) 0.41
Shellard Ln. /Park Access C'	NA	E (45)	E (45)

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2016 Levels of Service
Figure 14

10.220 Base E 09/09/11

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Legend:

Potential Transit Route

Potential Transit Stop

Not to Scale

Potential Future Transit Route and Stops

Figure 15

10.220 Base C 07/18/11

7. Transportation Management

7.1 Internal Traffic Flows

An estimate of the vehicular activity during the roadway peak hours has been completed for each of the primary roads within the North of Shellard Lane Community.

Figure 16 illustrates the vehicle flows during the roadway a. m. and p. m. peak hours.

It is very evident that the magnitude of vehicle flows on the primary internal minor collector road is very low. The other local roads within the community would have substantially less traffic flow movements.

The critical conclusion that can be reached from this analysis is that:

- All internal roads require no more than one lane of traffic in each direction of travel. The final selection of a pavement width is dependent on the need or desire to provide on-street parking and conform to the municipal boulevard requirements;

- Posted speeds limits can be kept at 40 kilometers per hour and consideration can be given to implementing traffic calming devices;

- No traffic signal control devices are required within the community. Standard traffic control devices can be applied.

At any intersection along the length of the major collector road roundabouts or traffic circles can be considered as an alternative to introducing stop sign traffic control devices.

If such devices are not considered then intersections with local roads can contain curb bump outs to facilitate pedestrian crossing movements and also to act as a traffic calming device.

7.2 Road Classifications

The recommended road classification for North of Shellard Lane Community is shown in Figure 17.

7.3 Internal Intersections and Lane Configurations

A suggested lane configuration pattern (cross-section) has been brought forward for the North of Shellard Lane Community + Recreation Centre lands.

The cross-sections for the internal roads are shown in Figures 18 and 19.

These cross-sections are based upon details presented in Official Plan Amendment No. 144.

Of note are the following:

- The major collector road requires exclusive left turn lanes at the intersections with the High school / Community Centre lands and Shellard Lane (if a roundabout or traffic circle is not favoured). It is noted that the roadway providing access from Street ‘C’ to the Community Center / Park area should have a minimum pavement width of 7.5 meters;

- No on-street parking should be permitted on the section of the major collector road between the High School / Community Centre intersection and Shellard Lane;

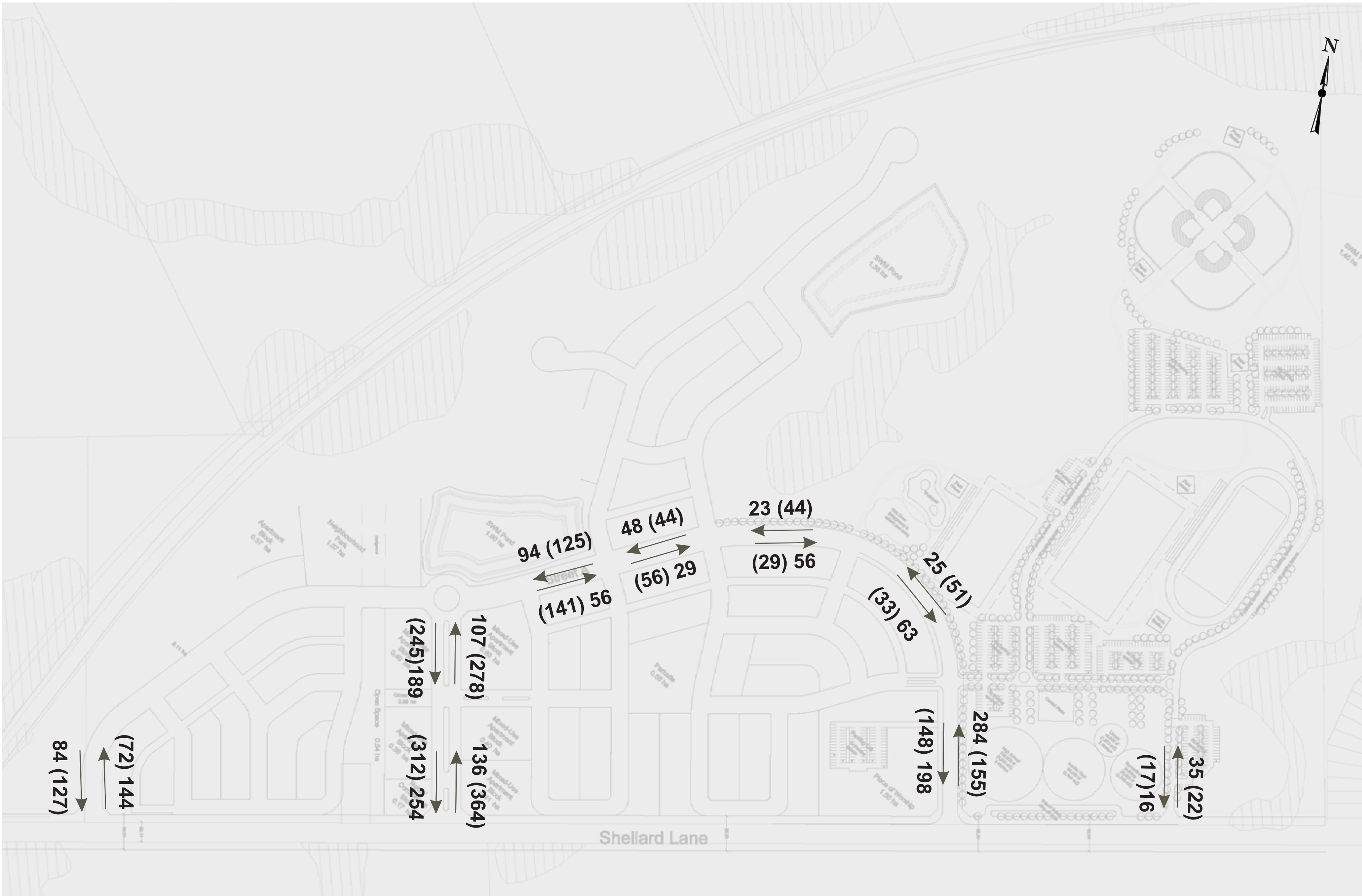
- No other intersection on the internal major collector or minor collector road requires exclusive turning lanes;

- The north-south section of the major collector road should have the ability to permit parking on both sides during normal business hours of the week. Parking should not be permitted within 50 meters of the round-about and 60 meters of the Shellard Lane curb intersection;

- Street ‘B’ immediately north of Shellard Lane is proposed to contain a centre median. As a result consideration must be given to a wider right-of-way for Street ‘B’ as shown in Figure 19 (cross-section D-D);

- Laneways are contained within the community plan. The typical requirements for a laneway are shown in Figure 19;

- Traffic circles can be considered as acceptable traffic control devices for any of the intersections along Street ‘C’ within the community. The typical standards applicable to a traffic circle are shown in Figure 19.



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Legend:

XX (YY): AM (PM) Peak Hour Volumes

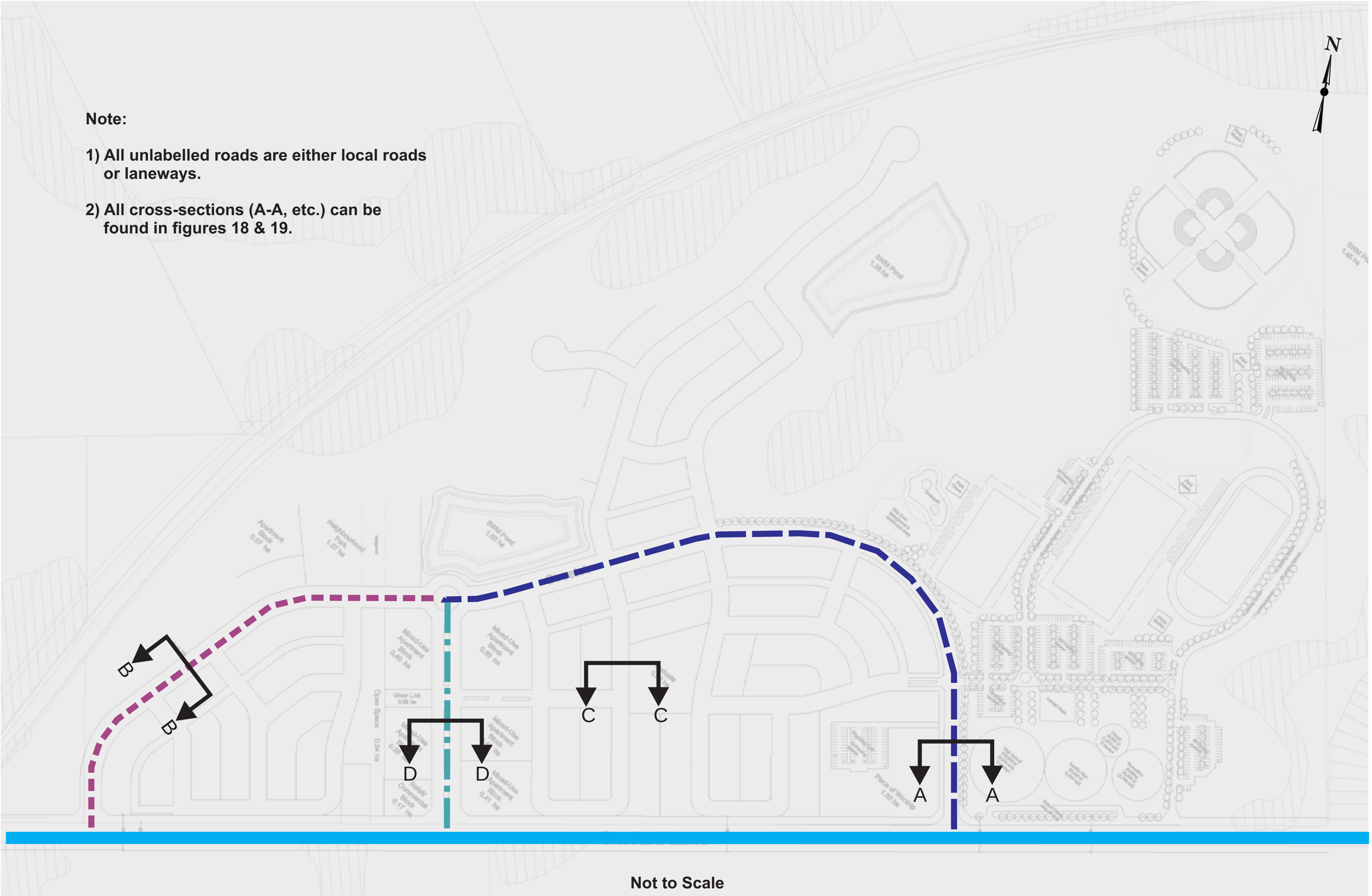
Not to Scale

Internal Traffic Flows

Roadway AM & PM Peak Hour Volumes

Figure 16

10.220 Base C 07/18/11



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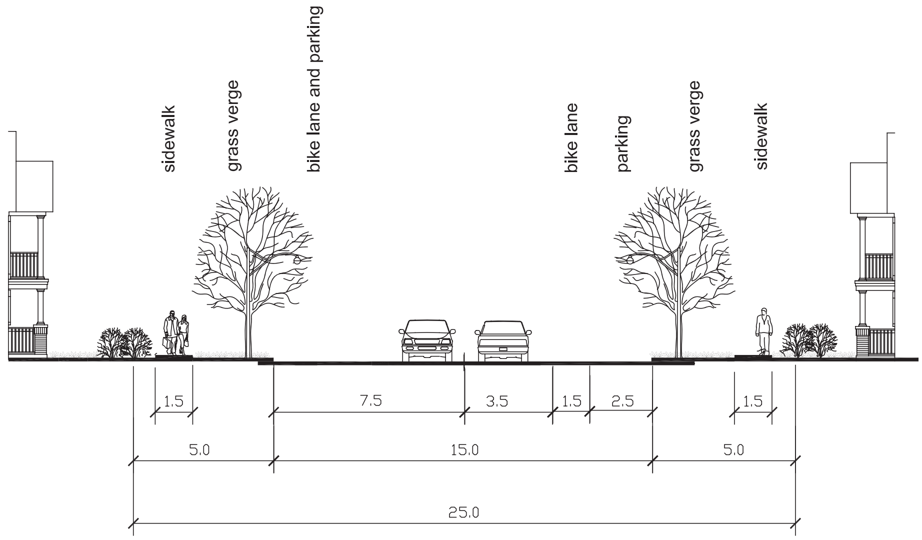
Legend:

- Arterial Road (4 lanes, after ~2017)
- Major Collector Road (2 Lanes, parking both sides)
- Minor Collector Road (2 Lanes, parking both sides)
- Major Collector Road w/ median (2 Lanes, parking both sides)

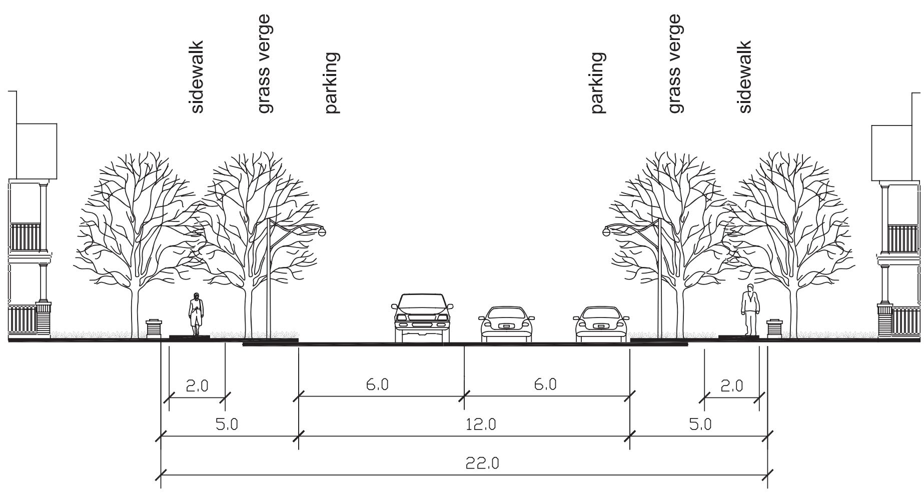
Road Classification
Figure 17

Cross Section
A - A



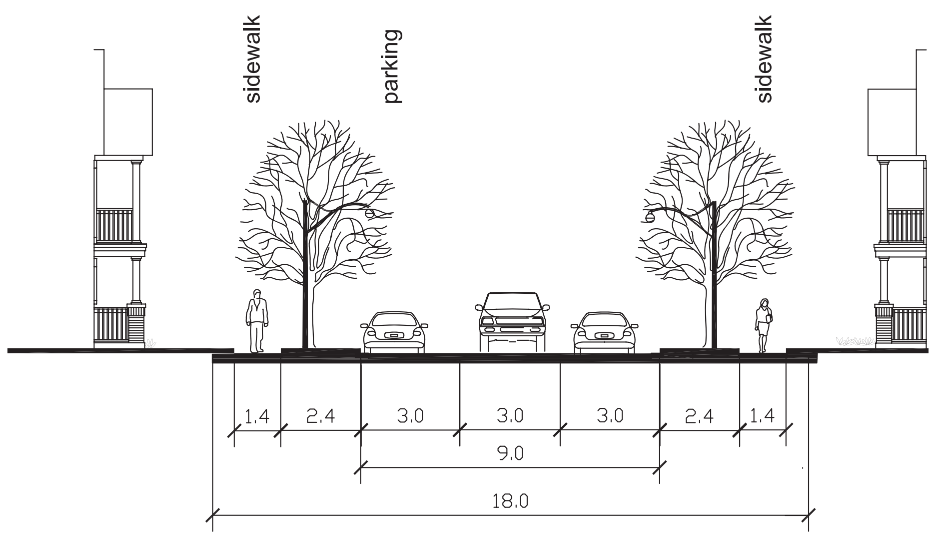
Major Collector Road

Cross Section
B - B



Minor Collector Road

Cross Section
C - C

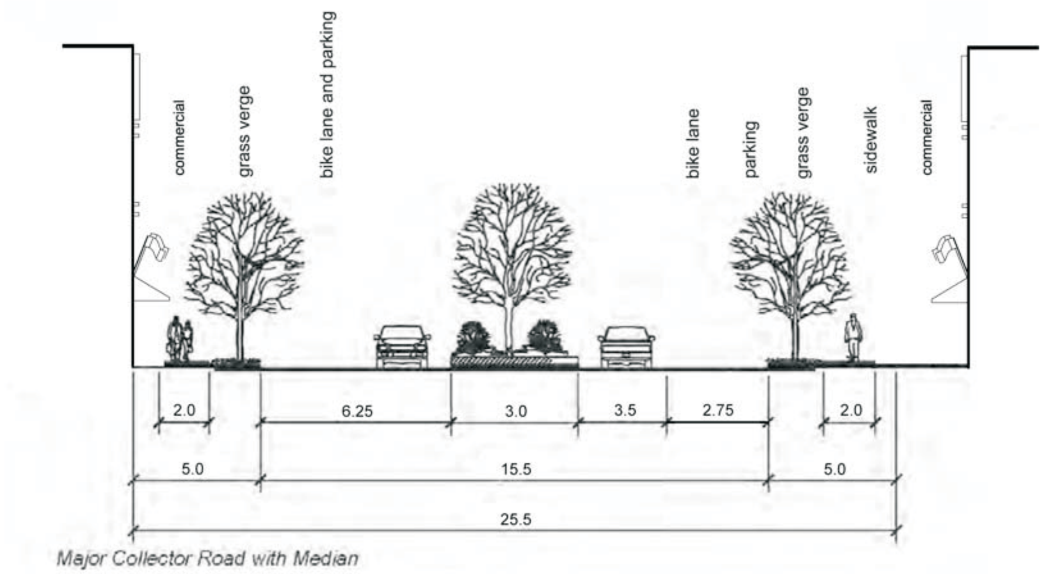


Local Road

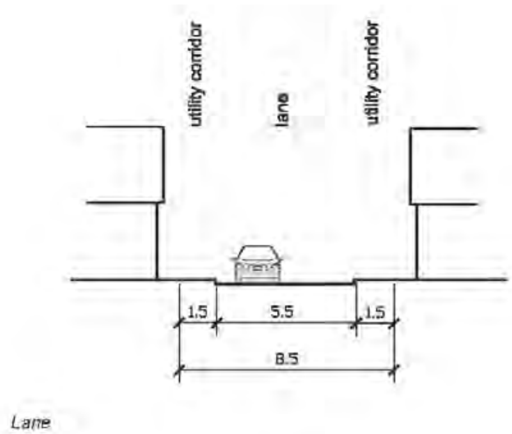
Poulos Chung

Not to Scale

Figure 18



Cross Section D - D



Lane Way

Table 2: Standards for Traffic Circles

Intersection	Inscribed Circle Radius (i.e outside circle dimension)	Radius of Inside Circle (at Mountable Apron)	Turning Road Width
Local-Local	12	6	6
Collector-Local or Collector-Collector	15	8	7
Arterial-Single Lane	20	12	8
Arterial-Double Lane	27.5	18.4	9.1

Trraffic Circles

Poulos Chung

Not to Scale

Figure 19

8. Conclusions and Recommendations

The analysis permits the following conclusions to be made:

- The North of Shellard Lane Community + Recreation Centre lands has formulated a Plan that provides a balanced transportation system capable of accommodating all primary modes of transportation;

- Vehicle flows generated are satisfactorily accommodated by a roadway lane configuration at acceptable levels of service in a calmed and efficient manner permitting convenient and comfortable sharing with pedestrians, bicyclists and transit users;

- Shellard Lane with its planned improvements and additions is capable of satisfactorily accommodating the planned north and south side community developments;

The analysis permits the following recommendations to be made:

- It is recommended that the timing and extent of Shellard Lane improvements and additions be confirmed by an Environmental Assessment process;

- That this report provides the vehicle demand flows for the North of Shellard Lane Community + Recreation Centre lands as critical vehicle demand input.

A Plan for Transit Improvements

The current transit system serves the 93,000 city residents using a fleet of 27 buses operating on nine fixed routes, which operate from the transit terminal on Darling Street. In 2005, the system carried 1.39 million fare paying passengers. This represents a market penetration of 15.2 rides per person. It is estimated that the current transit modal share is 3%.

There has been significant growth (roughly 33%) in ridership over the last eight years, thanks to a series of service improvements and the increased student population in the downtown area. The recent public attitudinal survey suggests that there is willingness by auto users to shift to transit provided there was improved level of transit service, better transit information, or financial incentive to use transit. The city is also poised for significant population and employment growth, with a significant portion of that growth to be accommodated within the downtown core area.

The preferred strategic direction for the TMP identified a "Modest Transit Improvement" as the preferred short-term planning direction, with an ultimate target for an aggressive focus on transit by 2031. Therefore the transit policies have been structured to provide an incremental approach to achieving these levels.

In the short to medium term, improvements to key performing transit routes will be provided through route optimization or the addition of new routes to improve overall mode share to 4% of peak hour trips. This will occur over the next 10 years.

Between 2016 and 2031, the City will begin a more aggressive 'Transit Focus', in conjunction with the realization of new growth in the downtown. The 'Transit Focus' will target improvements to key routes, through optimization and / or the addition of trunk routes along major arterials such as Colborne Street and the Toll Gate Road / Fairview Dr. / Lynden Road corridor, and on the West Street. and King George Road. corridors. It is envisioned that over 25 years this strategy will lead to increased transit ridership and improve the mode share by 6% as a result of growth and increased use of transit in the City.

Over the next 10 years the existing fleet will be upgraded to meet the 100% accessibility target and by 2031 the average age of the transit fleet will be reduced. Table 4 provides a breakdown of the capital cost for the transit improvement plan.

Short Term Service Improvements
In the short term, the transit service improvement strategy should focus on:

- An annual program of improvements to transit stops / shelters,
- Replacement of the aging fare box system and fleet,
- Improving downtown service / stop locations,
- Implementing various transit pass initiatives (U-Pass, Bulk Passes) and make passes convenient to purchase,
- Developing marketing / promotional materials to encourage and maintain transit ridership,
- Expanding service on Sundays and extending hours of service in key industrial areas,
- Investigating opportunities to implement transit priority on key corridors,

- Consider extending service to Paris (in conjunction with County),
- Developing transit supportive urban design guidelines to assist in making new developments easier to serve with transit,
- Investigating opportunities to provide bike racks on buses and/or bike storage at the transit terminal to encourage transit usage,
- Implementing transit service in new development areas to build ridership early, and
- Monitoring trends and report annually on progress

Medium to Longer Term Improvements
In the medium to long term, the transit service improvement strategy should focus on:

- Establishing satellite terminal(s) in the north end of the City (Lynden Park Mall / Brantford Mall),
- Restructuring routes to shorten travel times and/or create local circulator routes,
- Introducing trunk / express routes along key arterial corridors (Colborne Street., Toll Gate Road./Fairview Dr. / Lynden Road., West Street., King George Road) and between terminals and Via Station,
- Interlining (overlapping) trunk routes with local routes and allow transfers at key stops,
- Opportunities to increase service frequency on higher volume routes,
- Implementing a downtown transit shuttle service using small buses, short routes, frequent service (in conjunction with downtown growth),
- Planning for a new downtown transit terminal in a location that is convenient to major employment areas or attractions with increased capacity to accommodate new routes, and
- Increasing residential / employment density in key transit corridors (also referred to as intensification corridors)

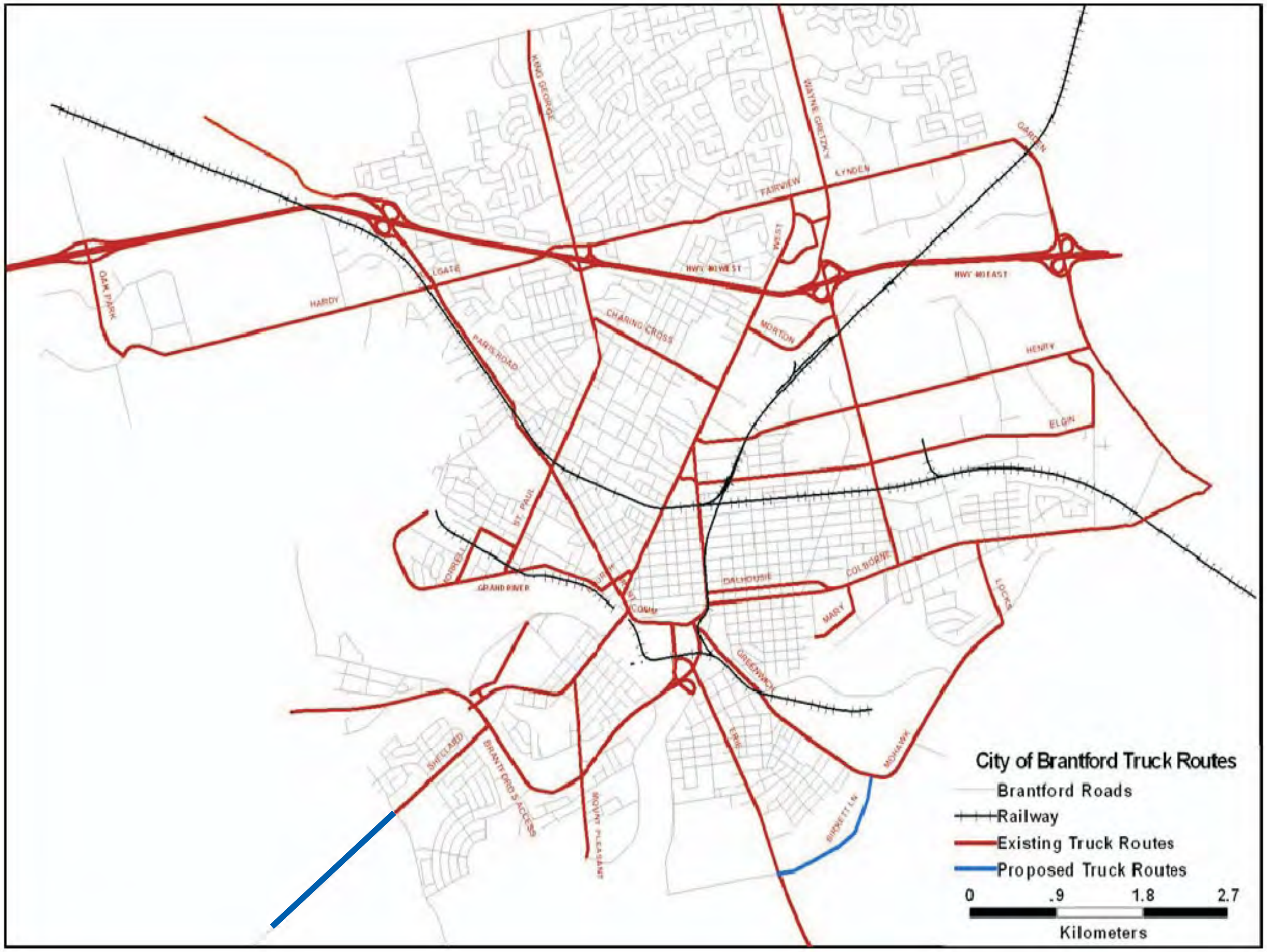
Ridership by 2031 = +90%

Capital Cost = $24.4 Million

Source: City of Brantford
Transportation Master Plan Update - Executive Summary

Appendix A-1
Plan for Transit Improvements

Figure 5.2 - Designated Truck Routes



Appendix A-2

Figure 6.12 – Roadway Classifications

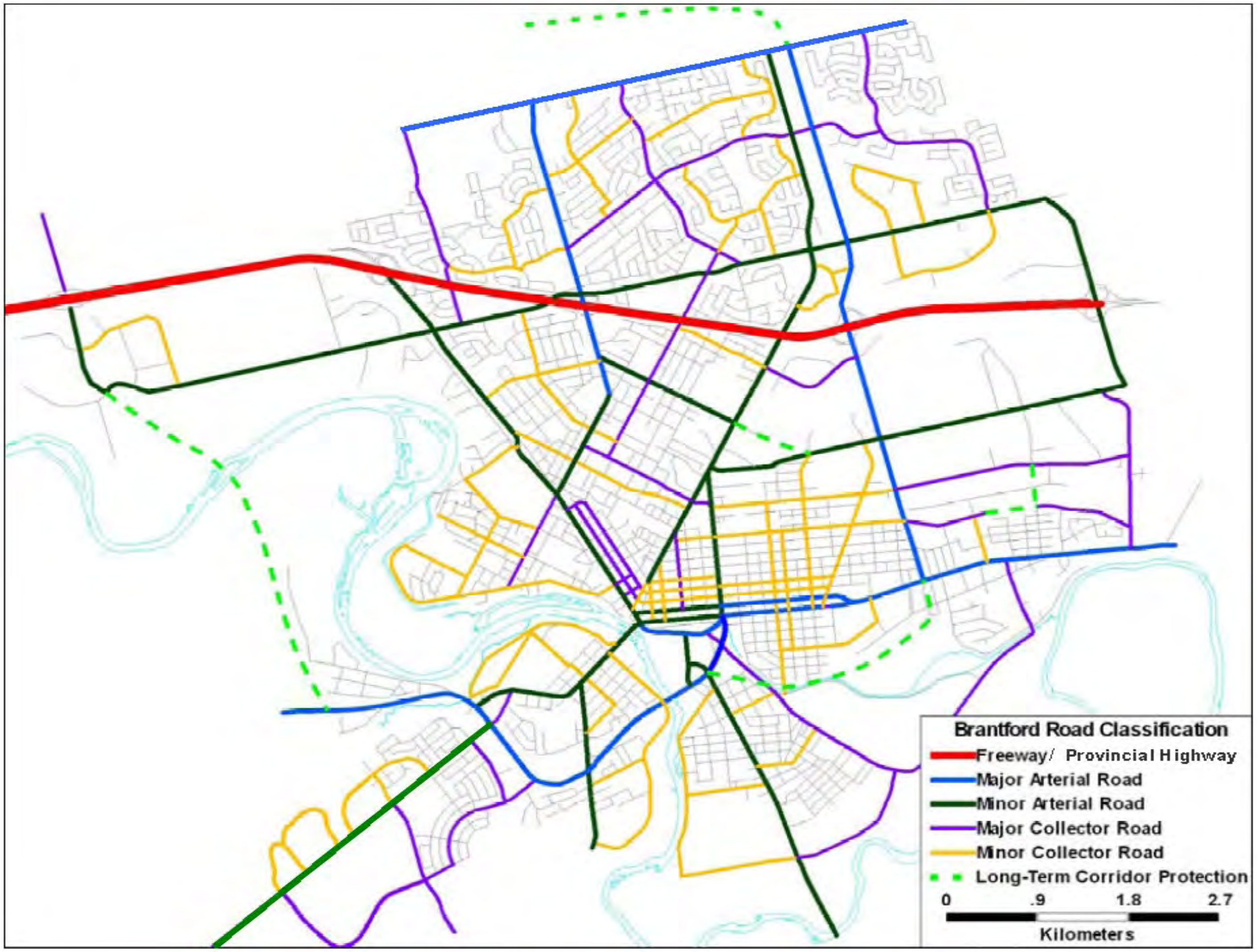


Figure 5.8 – Recommended Road Network Improvements

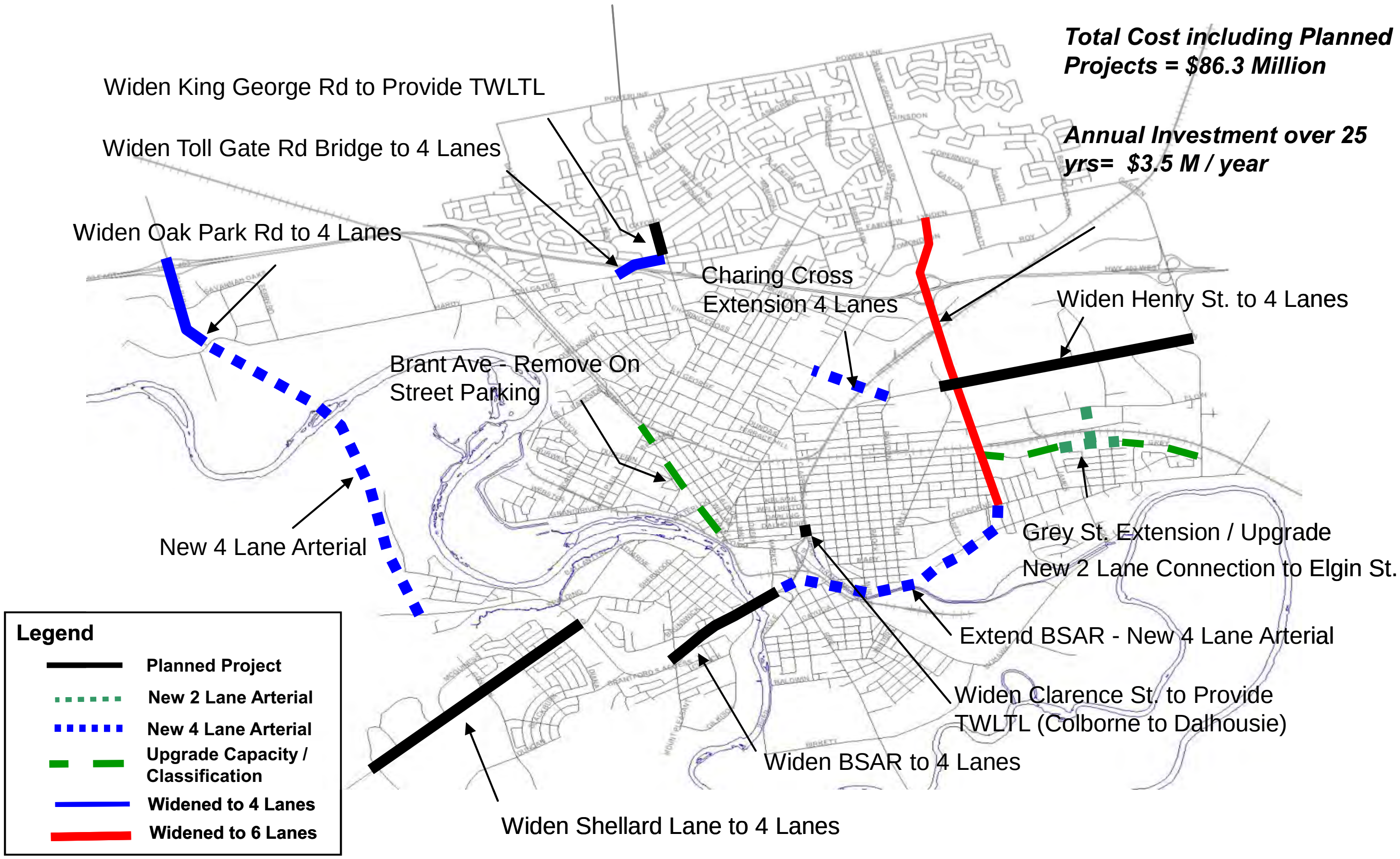
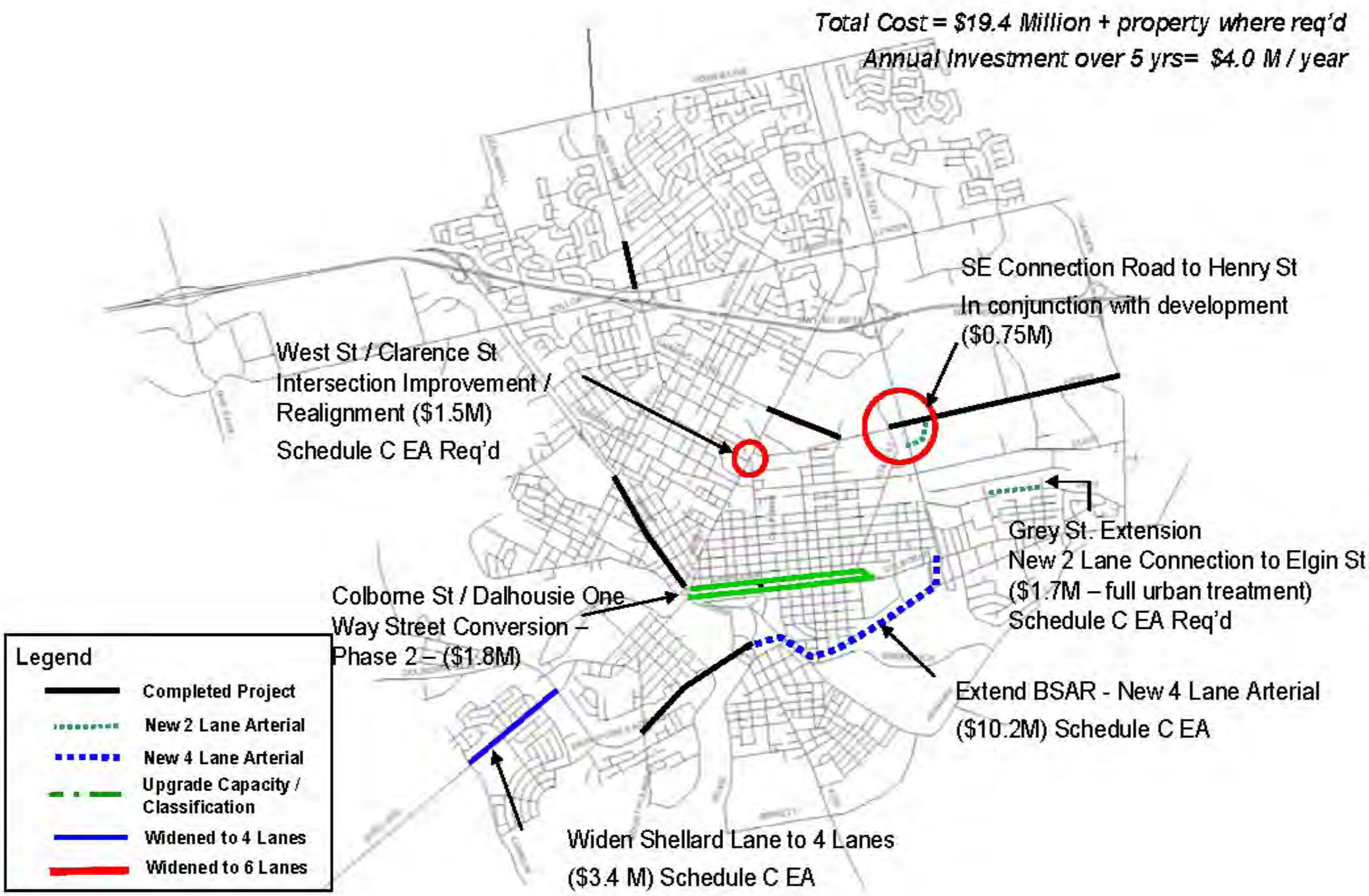
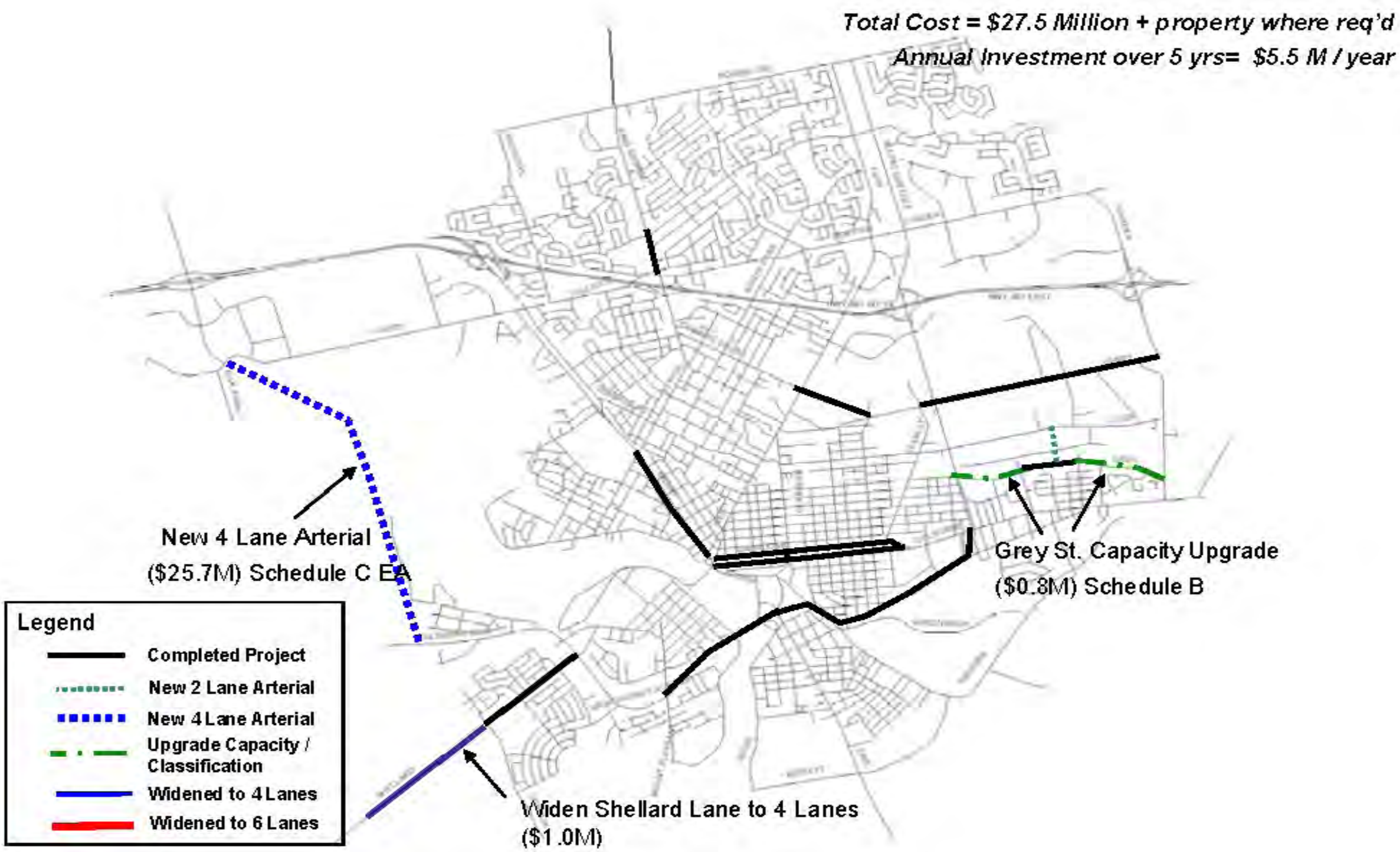


Figure 6.4 – Medium Term Road Network Priorities 2012-2016



Appendix A-5

Figure 6.6 –Road Network Priorities 2017-2021



Appendix A-6

Figure 5.5 - Recommended Cycling and Trail Network Plan

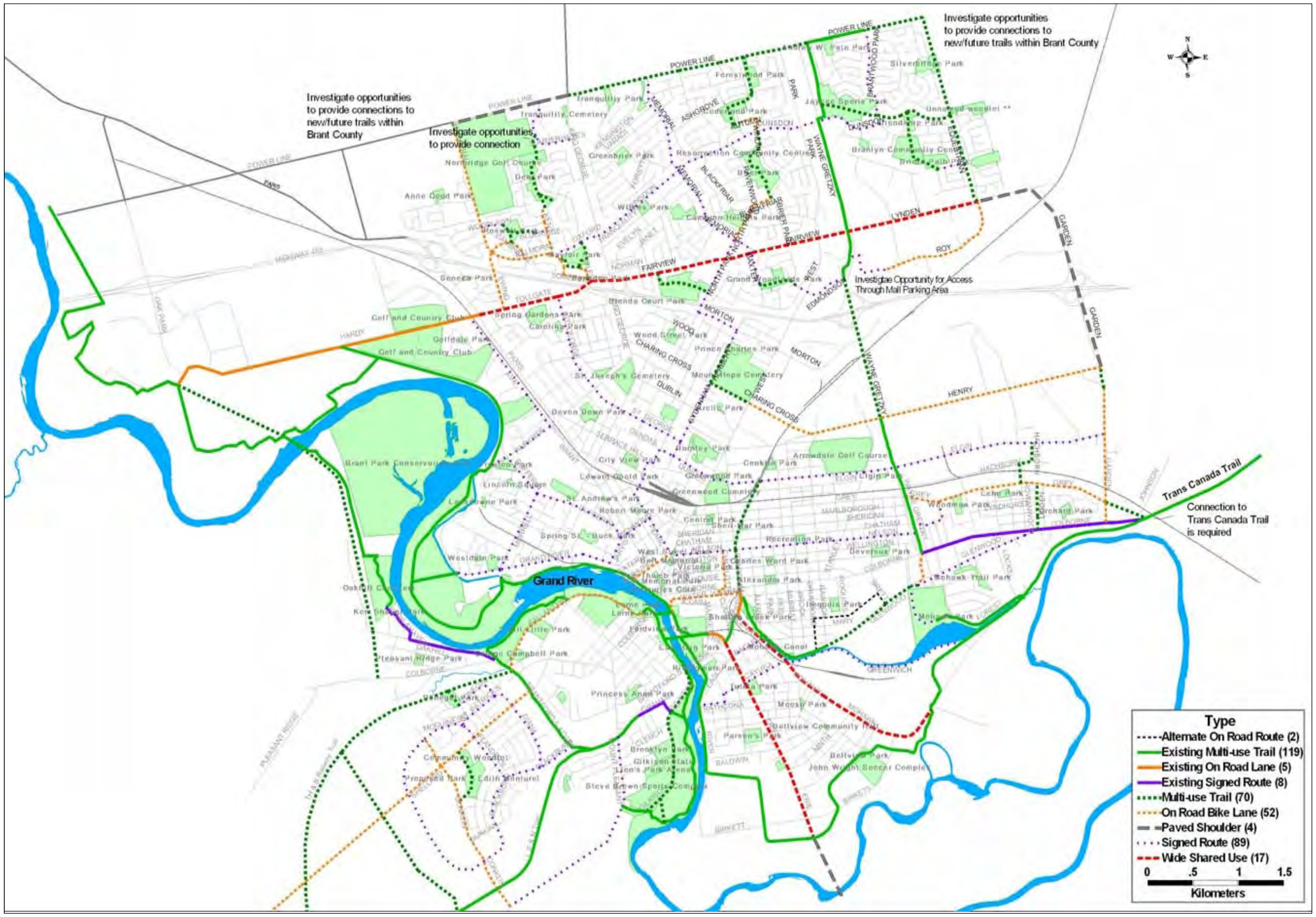


Figure 6.8 - Immediate Walking / Cycling Network Priorities 2007-2011

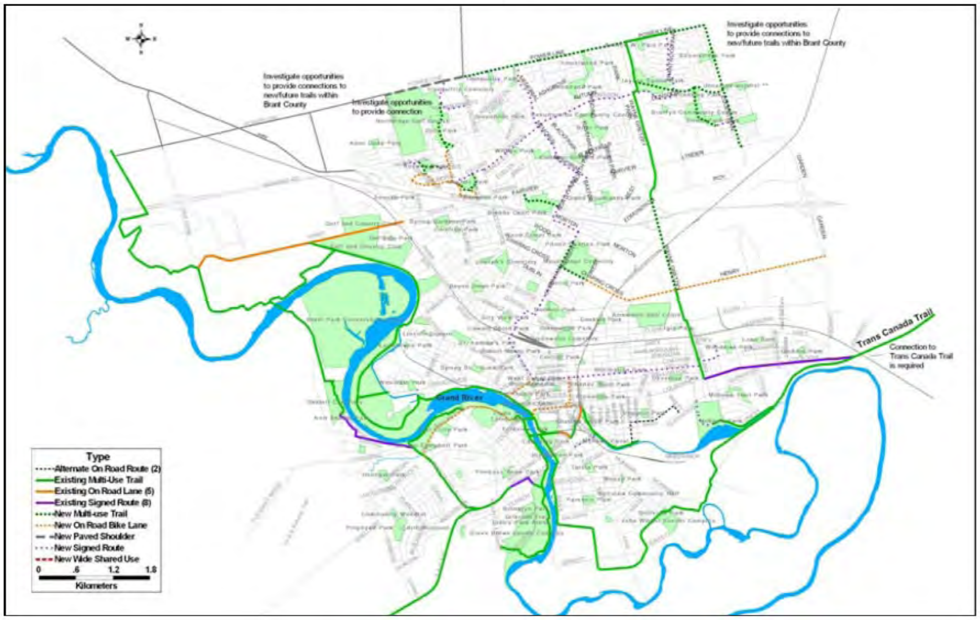


Figure 6.9 – Medium Term Walking / Cycling Network Priorities 2012-2016

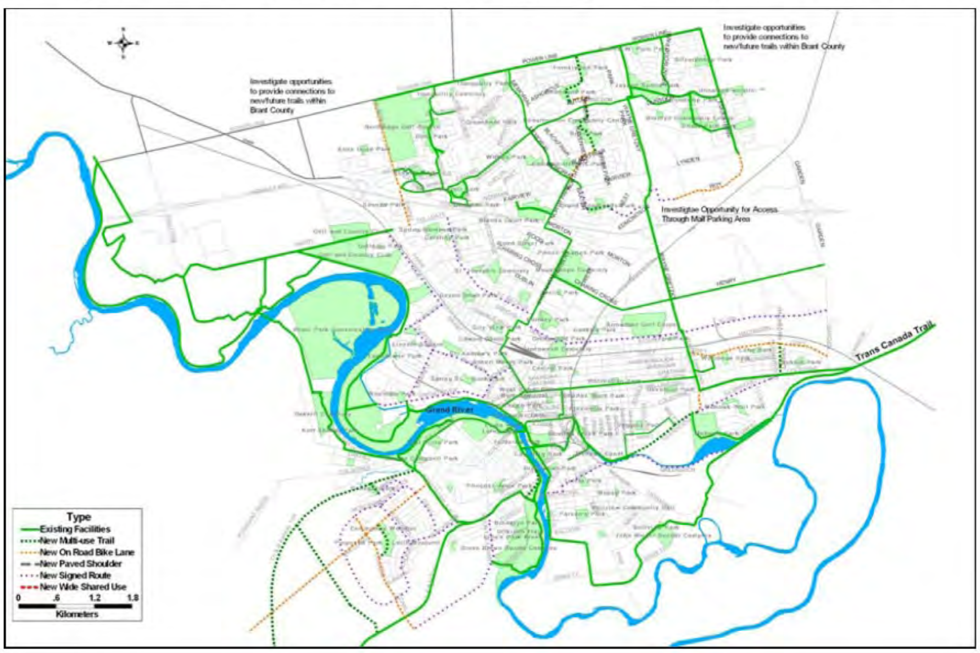
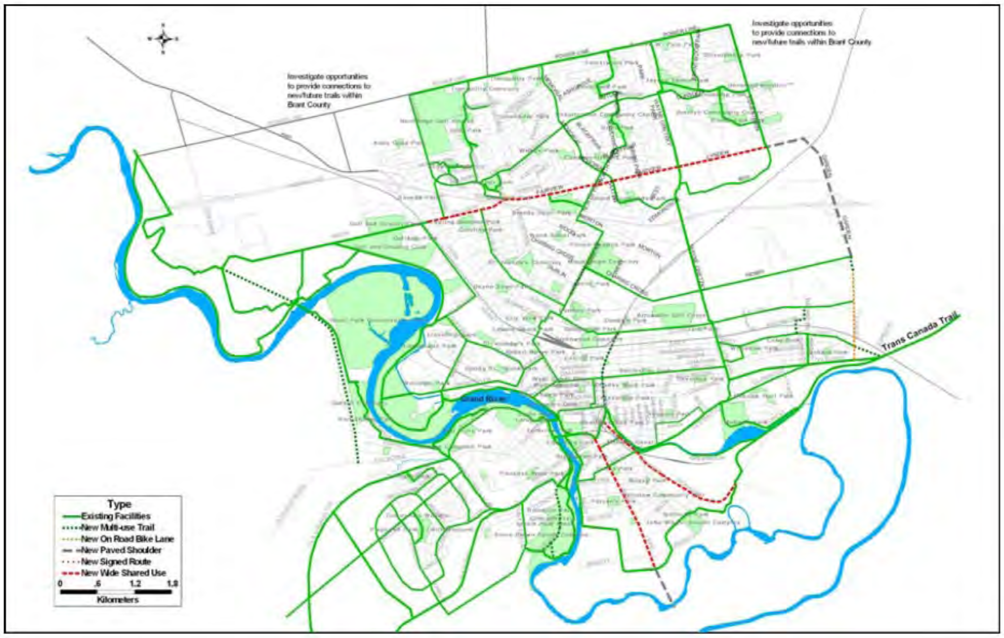


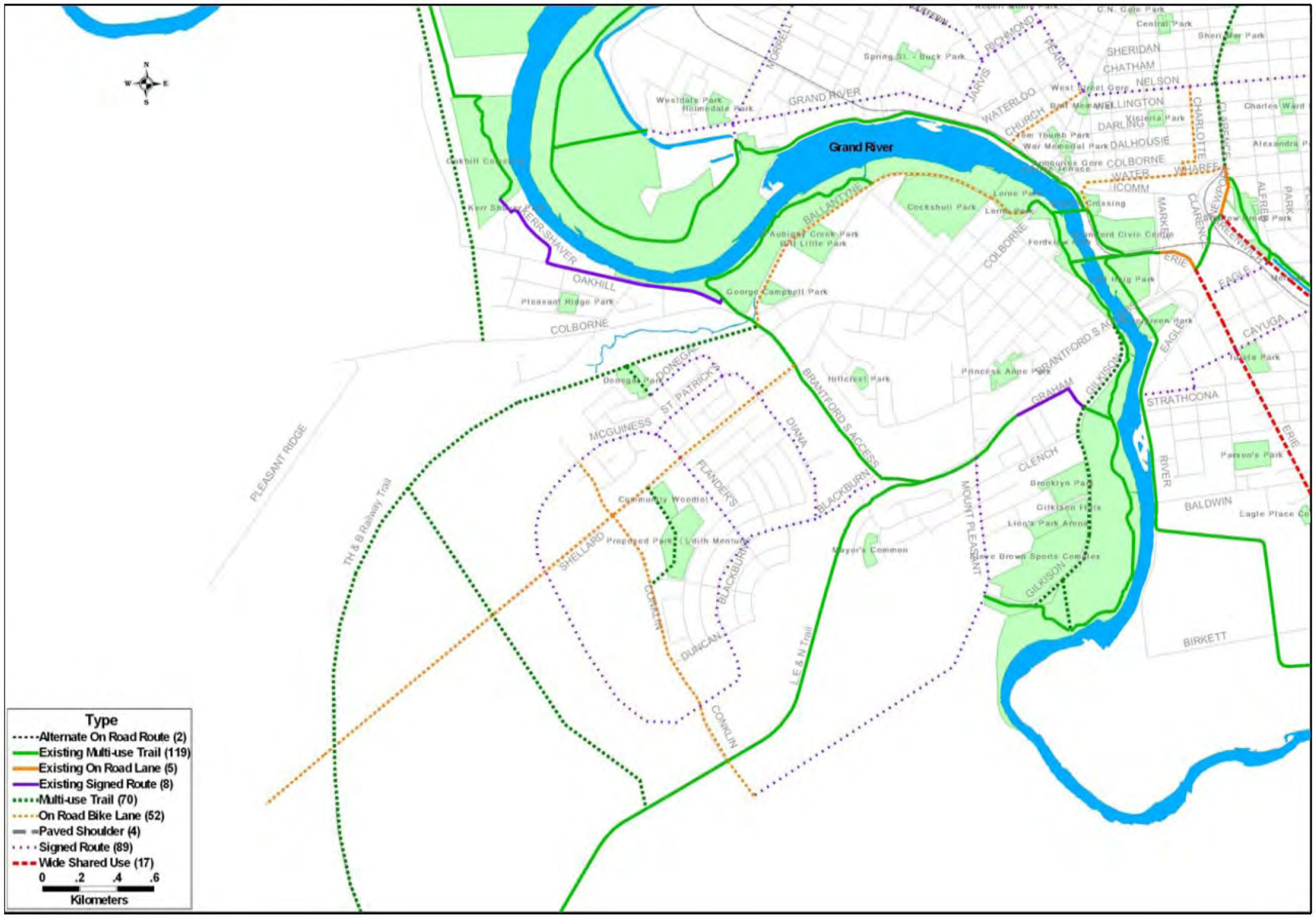
Figure 6.10 – Long Term Walking / Cycling Network Priorities 2017-2021



6.1.4 Capital Program Requirements

A detailed capital program summary and phasing plan for road improvements, walking and cycling trail infrastructure, and transit investments is provided in Tables 6.3 through 6.6.

Figure 5.8 - Recommended Cycling and Trail Network Plan – Southwest

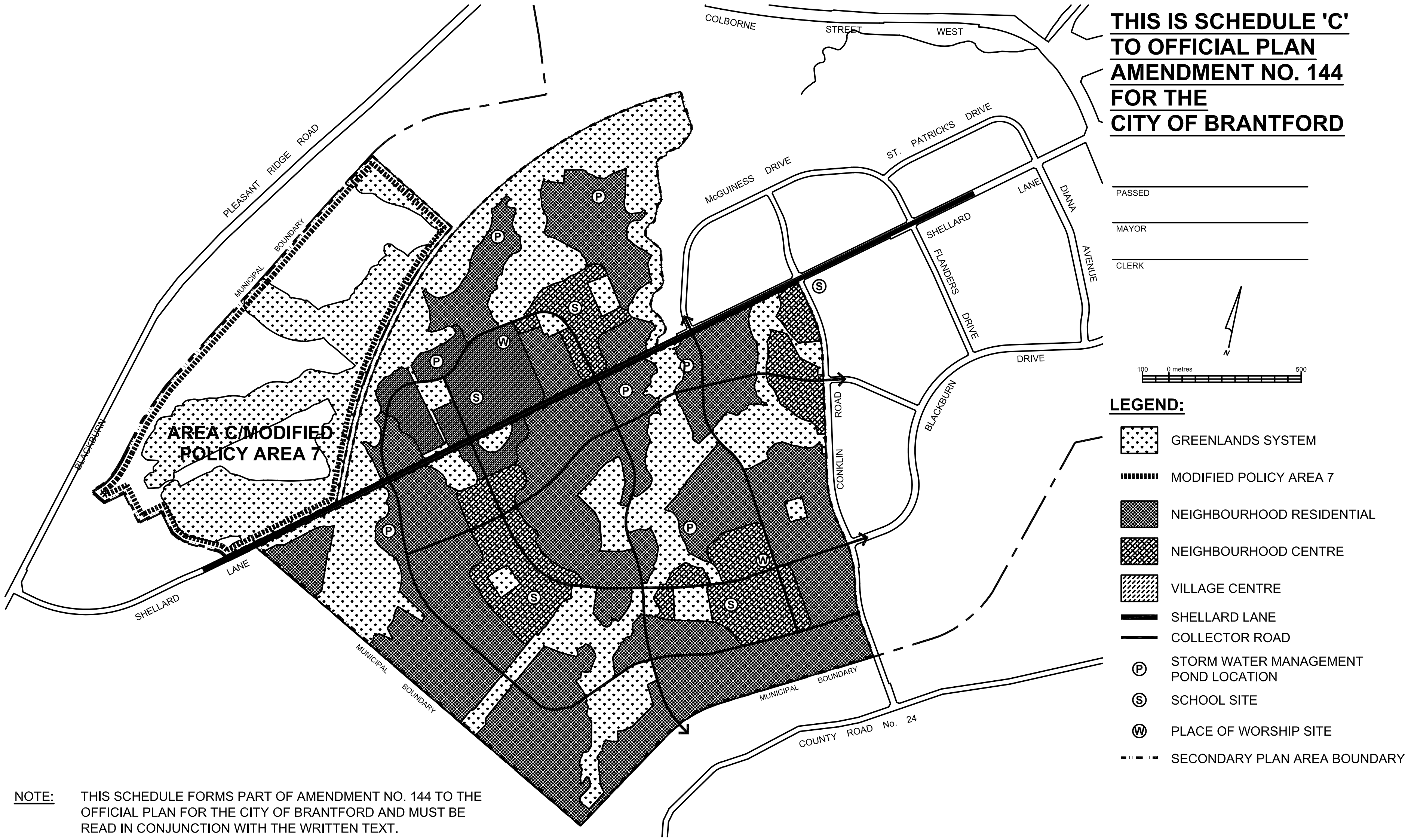


THIS IS SCHEDULE 'C' TO OFFICIAL PLAN AMENDMENT NO. 144 FOR THE CITY OF BRANTFORD

PASSED

MAYOR

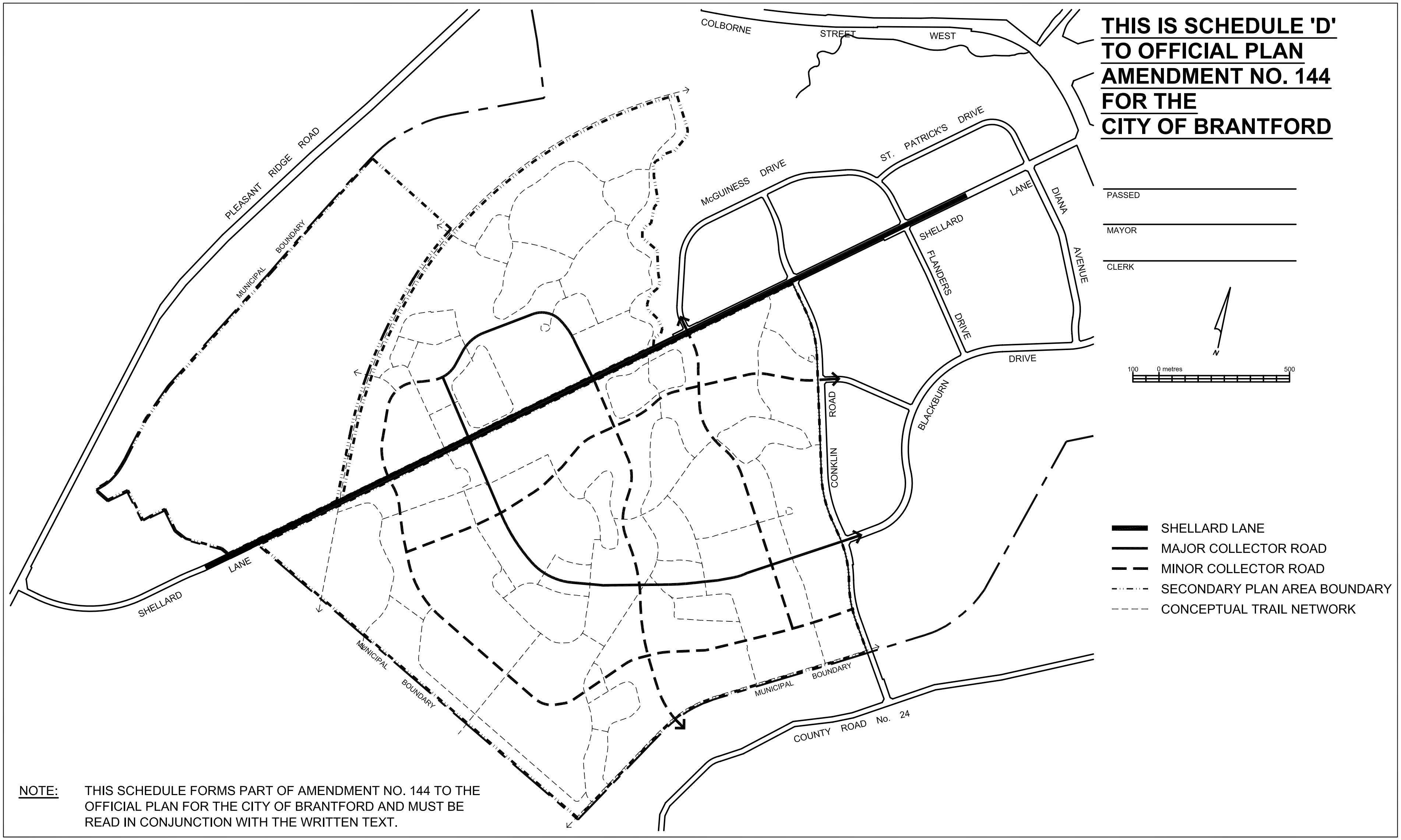
CLERK



NOTE: THIS SCHEDULE FORMS PART OF AMENDMENT NO. 144 TO THE OFFICIAL PLAN FOR THE CITY OF BRANTFORD AND MUST BE READ IN CONJUNCTION WITH THE WRITTEN TEXT.

Poulos & Chung

Appendix B-1

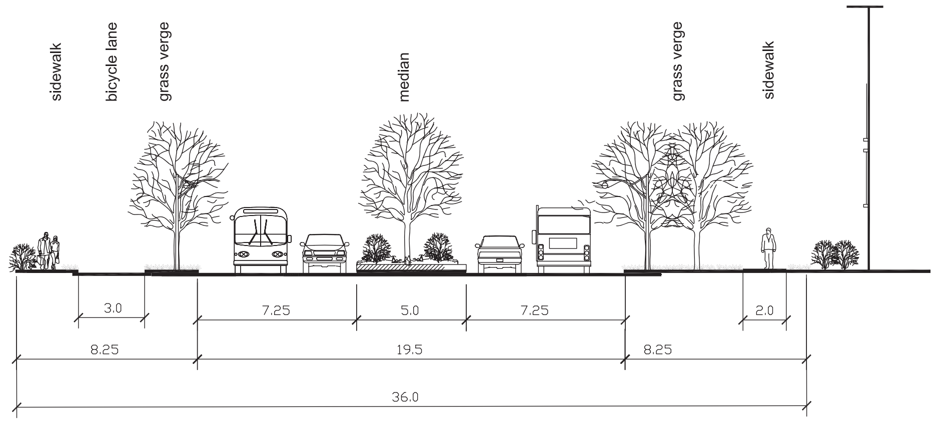


NOTE: THIS SCHEDULE FORMS PART OF AMENDMENT NO. 144 TO THE OFFICIAL PLAN FOR THE CITY OF BRANTFORD AND MUST BE READ IN CONJUNCTION WITH THE WRITTEN TEXT.

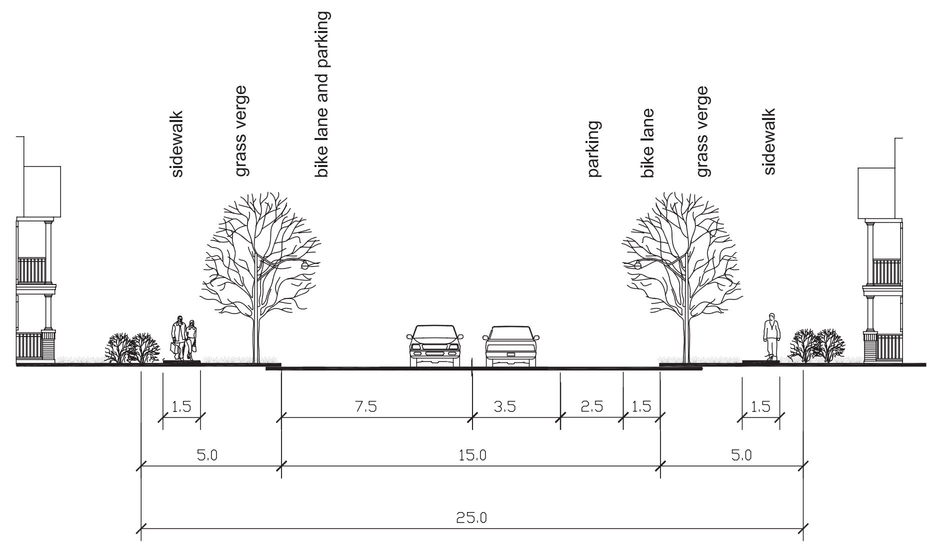
Poulos Chung

Appendix B-2

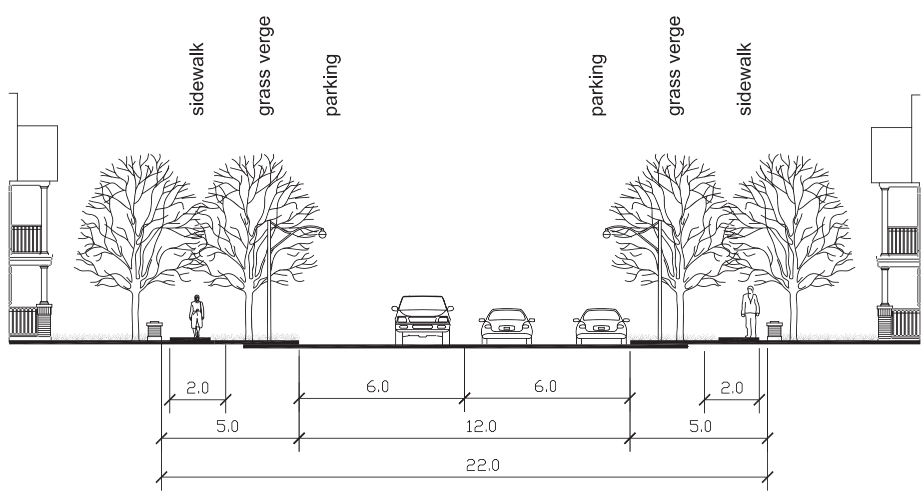
10.220 Base E 01/07/2011



Shellard Lane (Arterial Road)



Major Collector Road



Minor Collector Road

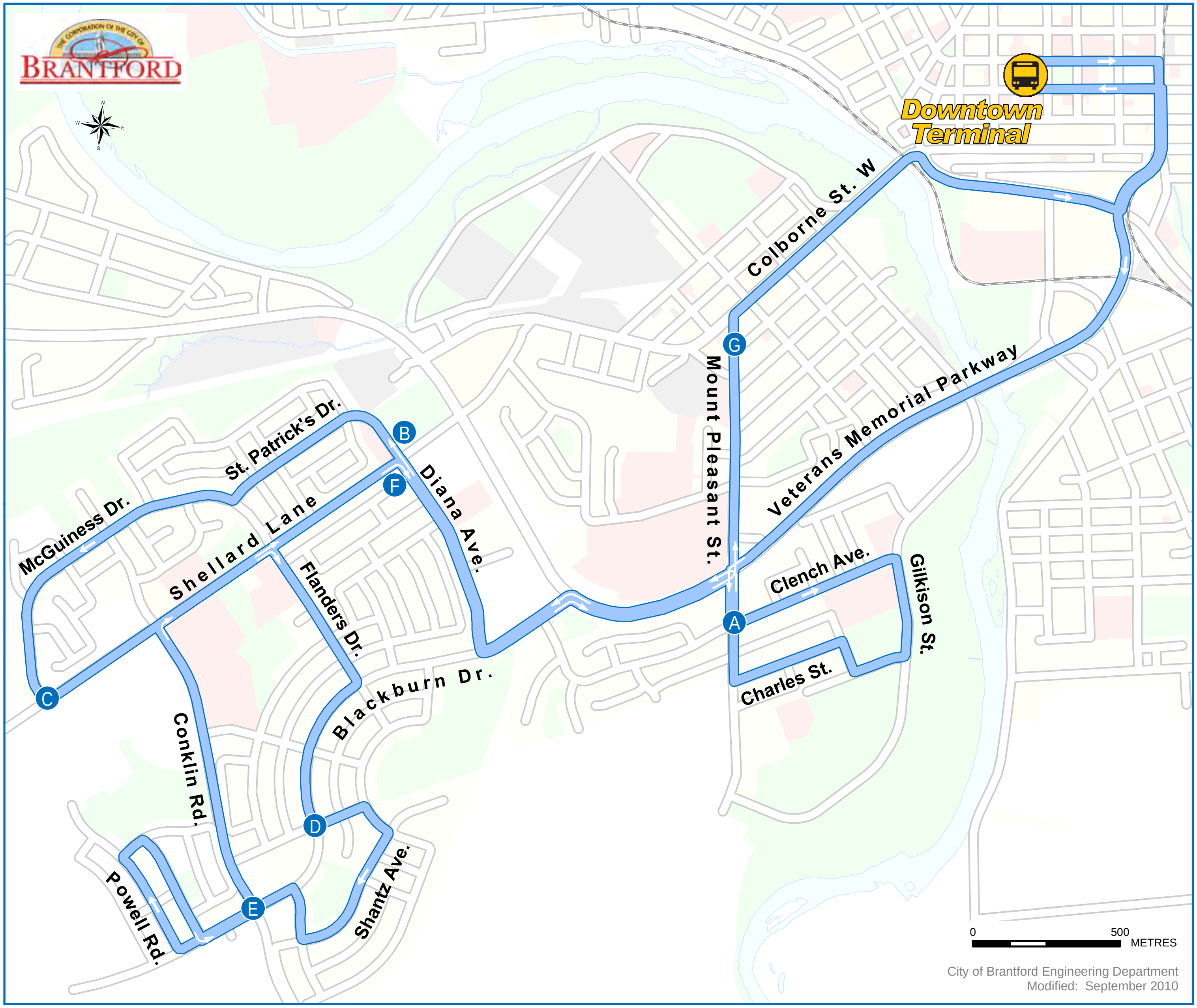
Poulos Chung

Not to Scale

Appendix B-3

10.220 Base F 1/10/11

6



6 WEST BRANT SHELLARD

MONDAY TO SATURDAY

TIME OF DAY	Transit Terminal	(A) Mount Pleasant & Clench Ave.	(B) St. Patrick's Dr. & Shellard Lane	(C) McGuiness Dr. & Shellard Lane	(D) Duncan Ave. & Matthews Crt.	(E) Warner Lane & Blackburn Dr.	(F) Shellard Lane & Diana Ave.	(G) Mount Pleasant & Balfour St.	Transit Terminal
AM					6:00	6:06	6:12	6:16	6:25
	6:00	6:07	6:15	6:19	6:30	6:36	6:42	6:46	6:55
	6:30	6:37	6:45	6:49	7:00	7:06	7:12	7:16	7:25
	7:00	7:07	7:15	7:19	7:30	7:36	7:42	7:46	7:55
	7:30	7:37	7:45	7:49	8:00	8:06	8:12	8:16	8:25
	8:00	8:07	8:15	8:19	8:30	8:36	8:42	8:46	8:55
	8:30	8:37	8:45	8:49	9:00	9:06	9:12	9:16	9:25
	9:00	9:07	9:15	9:19	9:30	9:36	9:42	9:46	9:55
	9:30	9:37	9:45	9:49	10:00	10:06	10:12	10:16	10:25
	10:00	10:07	10:15	10:19	10:30	10:36	10:42	10:46	10:55
	10:30	10:37	10:45	10:49	11:00	11:06	11:12	11:16	11:25
	11:00	11:07	11:15	11:19	11:30	11:36	11:42	11:46	11:55
	11:30	11:37	11:45	11:49	12:00	12:06	12:12	12:16	12:25
PM	12:00	12:07	12:15	12:19	12:30	12:36	12:42	12:46	12:55
	12:30	12:37	12:45	12:49	1:00	1:06	1:12	1:16	1:25
	1:00	1:07	1:15	1:19	1:30	1:36	1:42	1:46	1:55
	1:30	1:37	1:45	1:49	2:00	2:06	2:12	2:16	2:25
	2:00	2:07	2:15	2:19	2:30	2:36	2:42	2:46	2:55
	2:30	2:37	2:45	2:49	3:00	3:06	3:12	3:16	3:25
	3:00	3:07	3:15	3:19	3:30	3:36	3:42	3:46	3:55
	3:30	3:37	3:45	3:49	4:00	4:06	4:12	4:16	4:25
	4:00	4:07	4:15	4:19	4:30	4:36	4:42	4:46	4:55
	4:30	4:37	4:45	4:49	5:00	5:06	5:12	5:16	5:25
	5:00	5:07	5:15	5:19	5:30	5:36	5:42	5:46	5:55
	5:30	5:37	5:45	5:49	6:00	6:06	6:12	6:16	6:25
	6:00	6:07	6:15	6:19	6:30	6:36	6:42	6:46	6:55

Route #6 effective Sept. 27, 2010

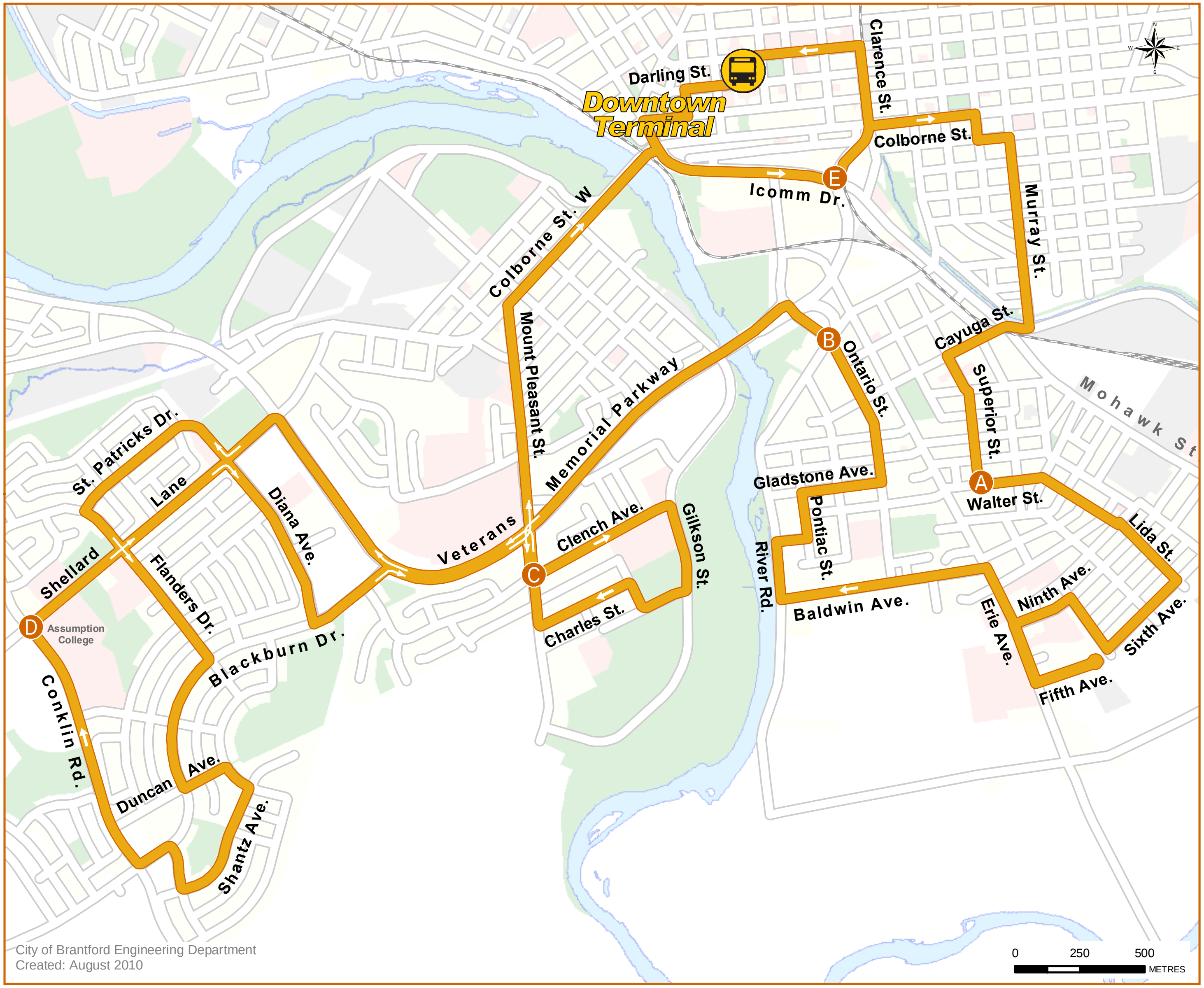
64 Darling St., Brantford
519-753-3847
www.brantford.ca/transit

Routes and scheduled times in effect at time of printing. Subject to change without notice.

Appendix C-1

12

Brantford TRANSIT
Evening & Sunday Service



12 EAGLE PLACE SHELLARD

TIME OF DAY	Transit Terminal	(A) Superior St. & Walter St.	(B) Ontario St. & Eagle Ave.	(C) Clench Ave. & Mount Pleasant	(D) Conklin Ave. & Shellard Lane	(E) Icomm Dr. & Market St. S	Transit Terminal
MONDAY TO SATURDAY							
PM	6:30	6:40	6:50	6:55	7:10	7:20	7:25
PM	7:30	7:40	7:50	7:55	8:10	8:20	8:25
PM	8:30	8:40	8:50	8:55	9:10	9:20	9:25
PM	9:30	9:40	9:50	9:55	10:10	10:20	10:25
PM	10:30	10:40	10:50	10:55	11:10	11:20	11:25
PM	11:30	11:40	11:50	11:55	12:10	12:20	12:25
PM	12:30	DROP OFF ONLY					
SUNDAY							
AM	8:30	8:40	8:50	8:55	9:10	9:20	9:25
AM	9:30	9:40	9:50	9:55	10:10	10:20	10:25
AM	10:30	10:40	10:50	10:55	11:10	11:20	11:25
AM	11:30	11:40	11:50	11:55	12:10	12:20	12:25
PM	12:30	12:40	12:50	12:55	1:10	1:20	1:25
PM	1:30	1:40	1:50	1:55	2:10	2:20	2:25
PM	2:30	2:40	2:50	2:55	3:10	3:20	3:25
PM	3:30	3:40	3:50	3:55	4:10	4:20	4:25
PM	4:30	4:40	4:50	4:55	5:10	5:20	5:25
PM	5:30	5:40	5:50	5:55	6:10	6:20	6:25

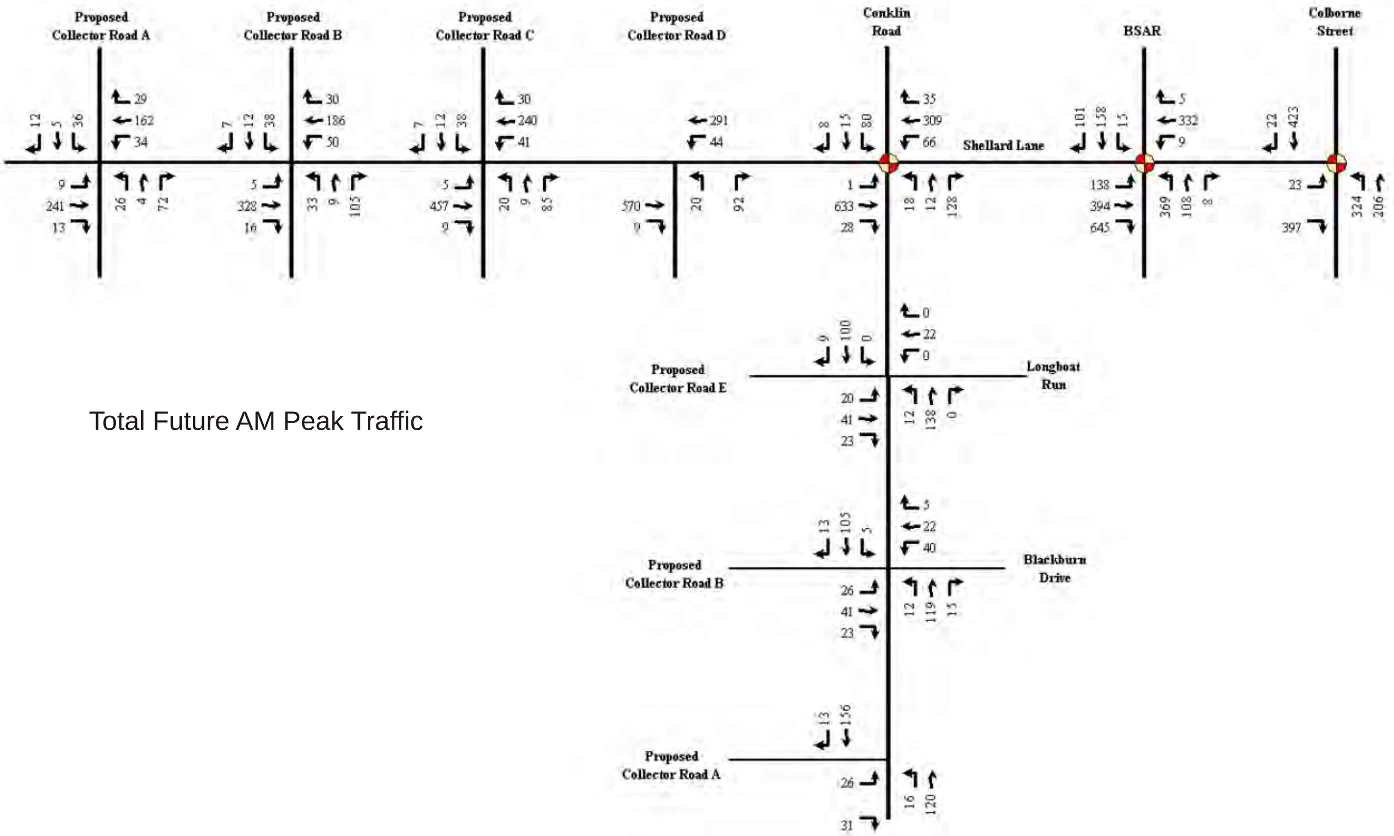
Route #12 effective Sept. 5, 2010

64 Darling St., Brantford
519-753-3847
www.brantford.ca/transit

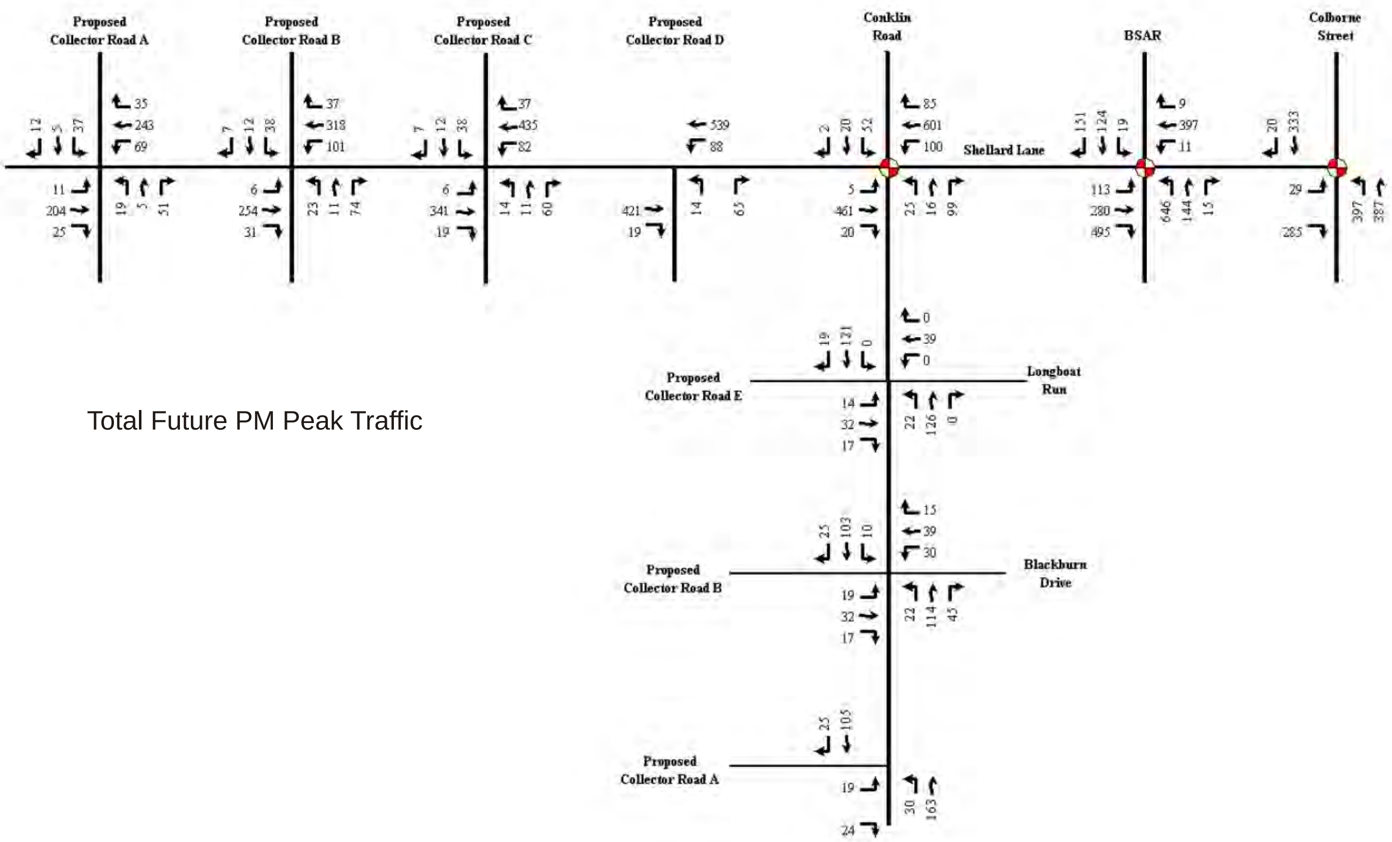
Routes and scheduled times in effect at time of printing. Subject to change without notice.

BRANTFORD

Appendix D Figure 6.2 from The Master Service and Traffic Report



Total Future AM Peak Traffic



Total Future PM Peak Traffic

Appendix D
Figure 6.2

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	8	281	13	34	199	62	26	2	72	72	3	9
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	9	305	14	37	216	67	28	2	78	78	3	10
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	284			320			523	688	160	573	661	142
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	284			320			523	688	160	573	661	142
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			97			93	99	91	78	99	99
cM capacity (veh/h)	1276			1237			417	354	857	354	367	880

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	9	204	116	37	144	139	28	80	78	13
Volume Left	9	0	0	37	0	0	28	0	78	0
Volume Right	0	0	14	0	0	67	0	78	0	10
cSH	1276	1700	1700	1237	1700	1700	417	825	354	652
Volume to Capacity	0.01	0.12	0.07	0.03	0.08	0.08	0.07	0.10	0.22	0.02
Queue Length 95th (m)	0.2	0.0	0.0	0.7	0.0	0.0	1.7	2.5	6.3	0.5
Control Delay (s)	7.8	0.0	0.0	8.0	0.0	0.0	14.3	9.8	18.1	10.6
Lane LOS	A			A			B	A	C	B
Approach Delay (s)	0.2			0.9			11.0		17.0	
Approach LOS							B		C	

Intersection Summary			
Average Delay	3.7		
Intersection Capacity Utilization	32.2%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	15	394	16	50	235	117	33	4	105	218	8	28
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	16	428	17	54	255	127	36	4	114	237	9	30
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	383			446			732	952	214	727	842	128
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	383			446			732	952	214	727	842	128
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	99			95			87	98	86	5	97	97
cM capacity (veh/h)	1172			1111			278	242	791	251	281	899

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	NB 2	SB 1	SB 2
Volume Total	16	214	214	17	54	128	128	127	36	118	237	39
Volume Left	16	0	0	0	54	0	0	0	36	0	237	0
Volume Right	0	0	0	17	0	0	0	127	0	114	0	30
cSH	1172	1700	1700	1700	1111	1700	1700	1700	278	730	251	603
Volume to Capacity	0.01	0.13	0.13	0.01	0.05	0.08	0.08	0.07	0.13	0.16	0.95	0.06
Queue Length 95th (m)	0.3	0.0	0.0	0.0	1.2	0.0	0.0	0.0	3.3	4.4	65.5	1.6
Control Delay (s)	8.1	0.0	0.0	0.0	8.4	0.0	0.0	0.0	19.9	10.9	86.3	11.4
Lane LOS	A				A				C	B	F	B
Approach Delay (s)	0.3				1.0				13.0		75.7	
Approach LOS									B		F	

Intersection Summary			
Average Delay	17.7		
Intersection Capacity Utilization	43.0%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	30	673	9	41	360	244	20	10	85	172	6	20
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	33	732	10	45	391	265	22	11	92	187	7	22
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	657			741			1107	1542	366	1009	1287	196
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	657			741			1107	1542	366	1009	1287	196
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			95			85	90	85	0	96	97
cM capacity (veh/h)	927			861			145	104	631	143	149	813

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	NB 2	SB 1	SB 2
Volume Total	33	366	366	10	45	196	196	265	22	103	187	28
Volume Left	33	0	0	0	45	0	0	0	22	0	187	0
Volume Right	0	0	0	10	0	0	0	265	0	92	0	22
cSH	927	1700	1700	1700	861	1700	1700	1700	145	412	143	401
Volume to Capacity	0.04	0.22	0.22	0.01	0.05	0.12	0.12	0.16	0.15	0.25	1.31	0.07
Queue Length 95th (m)	0.8	0.0	0.0	0.0	1.2	0.0	0.0	0.0	3.9	7.4	87.9	1.7
Control Delay (s)	9.0	0.0	0.0	0.0	9.4	0.0	0.0	0.0	34.1	16.6	239.8	14.7
Lane LOS	A				A				D	C	F	B
Approach Delay (s)	0.4				0.6				19.7		210.2	
Approach LOS									C		F	

Intersection Summary			
Average Delay	26.7		
Intersection Capacity Utilization	48.1%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	5	925	641	30	12	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	1005	697	33	13	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	729				1227	365
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	729				1227	365
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				92	99
cM capacity (veh/h)	870				170	632

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	5	503	503	464	265	13	4
Volume Left	5	0	0	0	0	13	0
Volume Right	0	0	0	0	33	0	4
cSH	870	1700	1700	1700	1700	170	632
Volume to Capacity	0.01	0.30	0.30	0.27	0.16	0.08	0.01
Queue Length 95th (m)	0.1	0.0	0.0	0.0	0.0	1.9	0.2
Control Delay (s)	9.2	0.0	0.0	0.0	0.0	28.0	10.7
Lane LOS	A					D	B
Approach Delay (s)	0.0			0.0		23.7	
Approach LOS						C	

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	35.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	16	252	25	69	282	124	19	4	51	110	4	14
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	17	274	27	75	307	135	21	4	55	120	4	15
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	441			301			643	914	151	753	860	221
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	441			301			643	914	151	753	860	221
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	98			94			94	98	94	54	98	98
cM capacity (veh/h)	1115			1257			327	252	869	260	270	783

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	WB 3	NB 1	NB 2	SB 1	SB 2
Volume Total	17	183	118	75	204	237	21	60	120	20
Volume Left	17	0	0	75	0	0	21	0	120	0
Volume Right	0	0	27	0	0	135	0	55	0	15
cSH	1115	1700	1700	1257	1700	1700	327	737	260	551
Volume to Capacity	0.02	0.11	0.07	0.06	0.12	0.14	0.06	0.08	0.46	0.04
Queue Length 95th (m)	0.4	0.0	0.0	1.4	0.0	0.0	1.5	2.0	17.2	0.8
Control Delay (s)	8.3	0.0	0.0	8.0	0.0	0.0	16.7	10.3	30.1	11.8
Lane LOS	A			A			C	B	D	B
Approach Delay (s)	0.5			1.2			12.0		27.5	
Approach LOS							B		D	

Intersection Summary			
Average Delay	5.3		
Intersection Capacity Utilization	37.9%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	40	340	31	101	418	238	23	11	74	269	9	34
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	43	370	34	110	454	259	25	12	80	292	10	37
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	713			403			945	1389	185	1032	1164	227
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	713			403			945	1389	185	1032	1164	227
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	95			90			86	90	90	0	94	95
cM capacity (veh/h)	883			1152			176	122	826	140	166	776

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	NB 2	SB 1	SB 2
Volume Total	43	185	185	34	110	227	227	259	25	92	292	47
Volume Left	43	0	0	0	110	0	0	0	25	0	292	0
Volume Right	0	0	0	34	0	0	0	259	0	80	0	37
cSH	883	1700	1700	1700	1152	1700	1700	1700	176	472	140	439
Volume to Capacity	0.05	0.11	0.11	0.02	0.10	0.13	0.13	0.15	0.14	0.20	2.09	0.11
Queue Length 95th (m)	1.2	0.0	0.0	0.0	2.4	0.0	0.0	0.0	3.7	5.5	180.3	2.7
Control Delay (s)	9.3	0.0	0.0	0.0	8.5	0.0	0.0	0.0	28.8	14.5	568.5	14.2
Lane LOS	A				A				D	B	F	B
Approach Delay (s)	0.9				1.1				17.5		492.1	
Approach LOS									C		F	

Intersection Summary			
Average Delay	98.6		
Intersection Capacity Utilization	46.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Sign Control		Free			Free			Stop			Stop	
Grade		0%			0%			0%			0%	
Volume (veh/h)	28	644	19	82	725	211	14	5	60	133	5	10
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	30	700	21	89	788	229	15	5	65	145	5	11
Pedestrians												
Lane Width (m)												
Walking Speed (m/s)												
Percent Blockage												
Right turn flare (veh)												
Median type								None			None	
Median storage veh)												
Upstream signal (m)												
pX, platoon unblocked												
vC, conflicting volume	1017			721			1347	1957	350	1445	1748	394
vC1, stage 1 conf vol												
vC2, stage 2 conf vol												
vCu, unblocked vol	1017			721			1347	1957	350	1445	1748	394
tC, single (s)	4.1			4.1			7.5	6.5	6.9	7.5	6.5	6.9
tC, 2 stage (s)												
tF (s)	2.2			2.2			3.5	4.0	3.3	3.5	4.0	3.3
p0 queue free %	96			90			83	90	90	0	93	98
cM capacity (veh/h)	678			877			91	54	646	69	73	605

Direction, Lane #	EB 1	EB 2	EB 3	EB 4	WB 1	WB 2	WB 3	WB 4	NB 1	NB 2	SB 1	SB 2
Volume Total	30	350	350	21	89	394	394	229	15	71	145	16
Volume Left	30	0	0	0	89	0	0	0	15	0	145	0
Volume Right	0	0	0	21	0	0	0	229	0	65	0	11
cSH	678	1700	1700	1700	877	1700	1700	1700	91	351	69	176
Volume to Capacity	0.04	0.21	0.21	0.01	0.10	0.23	0.23	0.13	0.17	0.20	2.11	0.09
Queue Length 95th (m)	1.1	0.0	0.0	0.0	2.6	0.0	0.0	0.0	4.3	5.6	102.7	2.3
Control Delay (s)	10.6	0.0	0.0	0.0	9.6	0.0	0.0	0.0	52.6	17.8	641.0	27.5
Lane LOS	B				A				F	C	F	D
Approach Delay (s)	0.4				0.8				24.0		578.8	
Approach LOS									C		F	

Intersection Summary			
Average Delay	45.8		
Intersection Capacity Utilization	47.4%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	5	832	1010	17	9	8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	904	1098	18	10	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (m)						
pX, platoon unblocked						
vC, conflicting volume	1116				1570	558
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1116				1570	558
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				90	98
cM capacity (veh/h)	621				100	473

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	5	452	452	732	384	10	9
Volume Left	5	0	0	0	0	10	0
Volume Right	0	0	0	0	18	0	9
cSH	621	1700	1700	1700	1700	100	473
Volume to Capacity	0.01	0.27	0.27	0.43	0.23	0.10	0.02
Queue Length 95th (m)	0.2	0.0	0.0	0.0	0.0	2.4	0.4
Control Delay (s)	10.8	0.0	0.0	0.0	0.0	44.7	12.8
Lane LOS	B					E	B
Approach Delay (s)	0.1			0.0		29.7	
Approach LOS						D	

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	38.5%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.96		1.00	0.85		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1566	3111		1566	3020		1566	1407		1566	1458	
Flt Permitted	0.58	1.00		0.56	1.00		0.75	1.00		0.70	1.00	
Satd. Flow (perm)	953	3111		920	3020		1235	1407		1162	1458	
Volume (vph)	8	281	13	34	199	62	26	2	72	72	3	9
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	9	305	14	37	216	67	28	2	78	78	3	10
RTOR Reduction (vph)	0	2	0	0	15	0	0	67	0	0	9	0
Lane Group Flow (vph)	9	317	0	37	268	0	28	13	0	78	4	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	66.4	66.4		66.4	66.4		9.6	9.6		9.6	9.6	
Effective Green, g (s)	69.4	69.4		69.4	69.4		12.6	12.6		12.6	12.6	
Actuated g/C Ratio	0.77	0.77		0.77	0.77		0.14	0.14		0.14	0.14	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	735	2399		709	2329		173	197		163	204	
v/s Ratio Prot		c0.10			0.09			0.01			0.00	
v/s Ratio Perm	0.01			0.04			0.02			c0.07		
v/c Ratio	0.01	0.13		0.05	0.11		0.16	0.07		0.48	0.02	
Uniform Delay, d1	2.4	2.6		2.5	2.6		34.1	33.6		35.7	33.4	
Progression Factor	1.00	1.00		0.78	0.68		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.0	0.1		0.1	0.1		0.4	0.1		2.2	0.0	
Delay (s)	2.4	2.7		2.1	1.9		34.5	33.7		37.9	33.4	
Level of Service	A	A		A	A		C	C		D	C	
Approach Delay (s)		2.7			1.9			33.9			37.2	
Approach LOS		A			A			C			D	

Intersection Summary			
HCM Average Control Delay	10.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.19		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	36.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1566	3131	1401	1566	3131	1401	1566	1409		1566	1458	
Flt Permitted	0.59	1.00	1.00	0.50	1.00	1.00	0.73	1.00		0.41	1.00	
Satd. Flow (perm)	979	3131	1401	817	3131	1401	1206	1409		684	1458	
Volume (vph)	15	394	16	50	235	117	33	4	105	218	8	28
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	16	428	17	54	255	127	36	4	114	237	9	30
RTOR Reduction (vph)	0	0	6	0	0	47	0	101	0	0	22	0
Lane Group Flow (vph)	16	428	11	54	255	80	36	17	0	237	17	0
Turn Type	Perm		Perm	Perm		Perm	Perm			pm+pt		
Protected Phases		2			6			8		7	4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	53.7	53.7	53.7	53.7	53.7	53.7	7.3	7.3		22.3	22.3	
Effective Green, g (s)	56.7	56.7	56.7	56.7	56.7	56.7	10.3	10.3		25.3	25.3	
Actuated g/C Ratio	0.63	0.63	0.63	0.63	0.63	0.63	0.11	0.11		0.28	0.28	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	617	1973	883	515	1973	883	138	161		300	410	
v/s Ratio Prot		c0.14			0.08			0.01		c0.10	0.01	
v/s Ratio Perm	0.02		0.01	0.07		0.06	0.03			c0.13		
v/c Ratio	0.03	0.22	0.01	0.10	0.13	0.09	0.26	0.11		0.79	0.04	
Uniform Delay, d1	6.3	7.1	6.2	6.6	6.7	6.5	36.4	35.7		27.9	23.5	
Progression Factor	0.76	0.76	0.59	0.90	0.92	0.74	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.3	0.0	0.4	0.1	0.2	1.0	0.3		13.2	0.0	
Delay (s)	4.9	5.7	3.7	6.4	6.3	5.0	37.4	36.0		41.1	23.6	
Level of Service	A	A	A	A	A	A	D	D		D	C	
Approach Delay (s)		5.6			5.9			36.3			38.6	
Approach LOS		A			A			D			D	

Intersection Summary			
HCM Average Control Delay	16.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.39		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	49.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87		1.00	0.89	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1566	3131	1401	1566	3131	1401	1566	1427		1566	1461	
Flt Permitted	0.52	1.00	1.00	0.34	1.00	1.00	0.74	1.00		0.45	1.00	
Satd. Flow (perm)	853	3131	1401	559	3131	1401	1217	1427		743	1461	
Volume (vph)	30	673	9	41	360	244	20	10	85	172	6	20
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	33	732	10	45	391	265	22	11	92	187	7	22
RTOR Reduction (vph)	0	0	4	0	0	100	0	82	0	0	16	0
Lane Group Flow (vph)	33	732	6	45	391	165	22	21	0	187	13	0
Turn Type	Perm		Perm	Perm		Perm	Perm			pm+pt		
Protected Phases		2			6			8		7	4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	53.2	53.2	53.2	53.2	53.2	53.2	7.0	7.0		22.8	22.8	
Effective Green, g (s)	56.2	56.2	56.2	56.2	56.2	56.2	10.0	10.0		25.8	25.8	
Actuated g/C Ratio	0.62	0.62	0.62	0.62	0.62	0.62	0.11	0.11		0.29	0.29	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	533	1955	875	349	1955	875	135	159		321	419	
v/s Ratio Prot		c0.23			0.12			0.01		c0.08	0.01	
v/s Ratio Perm	0.04		0.00	0.08		0.12	0.02			c0.09		
v/c Ratio	0.06	0.37	0.01	0.13	0.20	0.19	0.16	0.13		0.58	0.03	
Uniform Delay, d1	6.6	8.3	6.4	6.9	7.3	7.2	36.2	36.1		26.2	23.1	
Progression Factor	0.69	0.65	0.60	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.2	0.5	0.0	0.8	0.2	0.5	0.6	0.4		2.7	0.0	
Delay (s)	4.8	5.9	3.9	7.7	7.5	7.7	36.8	36.5		28.8	23.1	
Level of Service	A	A	A	A	A	A	D	D		C	C	
Approach Delay (s)		5.8			7.6			36.5			28.1	
Approach LOS		A			A			D			C	

Intersection Summary			
HCM Average Control Delay	11.3	HCM Level of Service	B
HCM Volume to Capacity ratio	0.43		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.8%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	5	925	641	30	12	4
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	1005	697	33	13	4
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (m)		150				
pX, platoon unblocked					0.91	
vC, conflicting volume	729				1227	365
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	729				1149	365
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				92	99
cM capacity (veh/h)	870				173	632

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	5	503	503	464	265	13	4
Volume Left	5	0	0	0	0	13	0
Volume Right	0	0	0	0	33	0	4
cSH	870	1700	1700	1700	1700	173	632
Volume to Capacity	0.01	0.30	0.30	0.27	0.16	0.08	0.01
Queue Length 95th (m)	0.1	0.0	0.0	0.0	0.0	1.8	0.2
Control Delay (s)	9.2	0.0	0.0	0.0	0.0	27.5	10.7
Lane LOS	A					D	B
Approach Delay (s)	0.0			0.0		23.3	
Approach LOS						C	

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	38.6%	ICU Level of Service	A
Analysis Period (min)	15		

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)	4.0	4.0		4.0	4.0		4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95		1.00	0.95		1.00	1.00		1.00	1.00	
Frt	1.00	0.99		1.00	0.95		1.00	0.86		1.00	0.88	
Flt Protected	0.95	1.00		0.95	1.00		0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1566	3089		1566	2988		1566	1418		1566	1453	
Flt Permitted	0.50	1.00		0.57	1.00		0.75	1.00		0.72	1.00	
Satd. Flow (perm)	817	3089		936	2988		1228	1418		1184	1453	
Volume (vph)	16	252	25	69	282	124	19	4	51	110	4	14
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	17	274	27	75	307	135	21	4	55	120	4	15
RTOR Reduction (vph)	0	4	0	0	25	0	0	46	0	0	13	0
Lane Group Flow (vph)	17	297	0	75	417	0	21	13	0	120	6	0
Turn Type	Perm			Perm			Perm			Perm		
Protected Phases		2			6			8			4	
Permitted Phases	2			6			8			4		
Actuated Green, G (s)	64.3	64.3		64.3	64.3		11.7	11.7		11.7	11.7	
Effective Green, g (s)	67.3	67.3		67.3	67.3		14.7	14.7		14.7	14.7	
Actuated g/C Ratio	0.75	0.75		0.75	0.75		0.16	0.16		0.16	0.16	
Clearance Time (s)	7.0	7.0		7.0	7.0		7.0	7.0		7.0	7.0	
Vehicle Extension (s)	3.0	3.0		3.0	3.0		3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	611	2310		700	2234		201	232		193	237	
v/s Ratio Prot		0.10			c0.14			0.01			0.00	
v/s Ratio Perm	0.02			0.08			0.02			c0.10		
v/c Ratio	0.03	0.13		0.11	0.19		0.10	0.06		0.62	0.03	
Uniform Delay, d1	2.9	3.2		3.1	3.3		32.0	31.8		35.1	31.6	
Progression Factor	1.00	1.00		1.24	1.50		1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.1	0.1		0.3	0.2		0.2	0.1		6.1	0.0	
Delay (s)	3.0	3.3		4.2	5.2		32.3	31.9		41.2	31.7	
Level of Service	A	A		A	A		C	C		D	C	
Approach Delay (s)		3.3			5.0			32.0			39.9	
Approach LOS		A			A			C			D	

Intersection Summary			
HCM Average Control Delay	11.1	HCM Level of Service	B
HCM Volume to Capacity ratio	0.26		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	43.3%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.87		1.00	0.88	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1566	3131	1401	1566	3131	1401	1566	1433		1566	1454	
Flt Permitted	0.47	1.00	1.00	0.52	1.00	1.00	0.73	1.00		0.48	1.00	
Satd. Flow (perm)	769	3131	1401	857	3131	1401	1197	1433		796	1454	
Volume (vph)	40	340	31	101	418	238	23	11	74	269	9	34
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	43	370	34	110	454	259	25	12	80	292	10	37
RTOR Reduction (vph)	0	0	16	0	0	119	0	71	0	0	23	0
Lane Group Flow (vph)	43	370	18	110	454	140	25	21	0	292	24	0
Turn Type	Perm		Perm	Perm		Perm	Perm			pm+pt		
Protected Phases		2			6			8		7	4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	45.5	45.5	45.5	45.5	45.5	45.5	7.0	7.0		30.5	30.5	
Effective Green, g (s)	48.5	48.5	48.5	48.5	48.5	48.5	10.0	10.0		33.5	33.5	
Actuated g/C Ratio	0.54	0.54	0.54	0.54	0.54	0.54	0.11	0.11		0.37	0.37	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	414	1687	755	462	1687	755	133	159		463	541	
v/s Ratio Prot		0.12			c0.14			0.01		c0.14	0.02	
v/s Ratio Perm	0.06		0.01	0.13		0.10	0.02			c0.10		
v/c Ratio	0.10	0.22	0.02	0.24	0.27	0.18	0.19	0.13		0.63	0.04	
Uniform Delay, d1	10.1	10.9	9.7	11.0	11.2	10.6	36.3	36.1		21.9	18.0	
Progression Factor	0.73	0.75	0.44	1.47	1.43	3.84	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.5	0.3	0.1	1.1	0.4	0.5	0.7	0.4		2.8	0.0	
Delay (s)	7.9	8.5	4.4	17.3	16.3	41.3	37.0	36.5		24.7	18.1	
Level of Service	A	A	A	B	B	D	D	D		C	B	
Approach Delay (s)		8.1			24.3			36.6			23.8	
Approach LOS		A			C			D			C	

Intersection Summary			
HCM Average Control Delay	20.9	HCM Level of Service	C
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	52.9%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Ideal Flow (vphpl)	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700	1700
Total Lost time (s)	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0		4.0	4.0	
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00		1.00	1.00	
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	0.86		1.00	0.90	
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00		0.95	1.00	
Satd. Flow (prot)	1566	3131	1401	1566	3131	1401	1566	1419		1566	1478	
Flt Permitted	0.31	1.00	1.00	0.35	1.00	1.00	0.75	1.00		0.51	1.00	
Satd. Flow (perm)	514	3131	1401	578	3131	1401	1231	1419		833	1478	
Volume (vph)	28	644	19	82	725	211	14	5	60	133	5	10
Peak-hour factor, PHF	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Adj. Flow (vph)	30	700	21	89	788	229	15	5	65	145	5	11
RTOR Reduction (vph)	0	0	8	0	0	89	0	58	0	0	8	0
Lane Group Flow (vph)	30	700	13	89	788	140	15	12	0	145	8	0
Turn Type	Perm		Perm	Perm		Perm	Perm			pm+pt		
Protected Phases		2			6			8		7	4	
Permitted Phases	2		2	6		6	8			4		
Actuated Green, G (s)	52.1	52.1	52.1	52.1	52.1	52.1	6.8	6.8		23.9	23.9	
Effective Green, g (s)	55.1	55.1	55.1	55.1	55.1	55.1	9.8	9.8		26.9	26.9	
Actuated g/C Ratio	0.61	0.61	0.61	0.61	0.61	0.61	0.11	0.11		0.30	0.30	
Clearance Time (s)	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0		4.0	7.0	
Vehicle Extension (s)	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0		3.0	3.0	
Lane Grp Cap (vph)	315	1917	858	354	1917	858	134	155		356	442	
v/s Ratio Prot		0.22			c0.25			0.01		c0.06	0.01	
v/s Ratio Perm	0.06		0.01	0.15		0.10	0.01			c0.06		
v/c Ratio	0.10	0.37	0.01	0.25	0.41	0.16	0.11	0.08		0.41	0.02	
Uniform Delay, d1	7.2	8.7	6.8	8.0	9.0	7.5	36.2	36.0		24.5	22.2	
Progression Factor	0.68	0.66	0.60	1.00	1.00	1.00	1.00	1.00		1.00	1.00	
Incremental Delay, d2	0.6	0.5	0.0	1.7	0.7	0.4	0.4	0.2		0.8	0.0	
Delay (s)	5.5	6.2	4.1	9.7	9.7	7.9	36.5	36.3		25.2	22.3	
Level of Service	A	A	A	A	A	A	D	D		C	C	
Approach Delay (s)		6.2			9.3			36.3			24.9	
Approach LOS		A			A			D			C	

Intersection Summary			
HCM Average Control Delay	10.5	HCM Level of Service	B
HCM Volume to Capacity ratio	0.41		
Actuated Cycle Length (s)	90.0	Sum of lost time (s)	8.0
Intersection Capacity Utilization	54.0%	ICU Level of Service	A
Analysis Period (min)	15		
c Critical Lane Group			

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Sign Control		Free	Free		Stop	
Grade		0%	0%		0%	
Volume (veh/h)	5	832	1010	17	9	8
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92
Hourly flow rate (vph)	5	904	1098	18	10	9
Pedestrians						
Lane Width (m)						
Walking Speed (m/s)						
Percent Blockage						
Right turn flare (veh)						
Median type					None	
Median storage veh)						
Upstream signal (m)		150				
pX, platoon unblocked					0.91	
vC, conflicting volume	1116				1570	558
vC1, stage 1 conf vol						
vC2, stage 2 conf vol						
vCu, unblocked vol	1116				1529	558
tC, single (s)	4.1				6.8	6.9
tC, 2 stage (s)						
tF (s)	2.2				3.5	3.3
p0 queue free %	99				90	98
cM capacity (veh/h)	621				98	473

Direction, Lane #	EB 1	EB 2	EB 3	WB 1	WB 2	SB 1	SB 2
Volume Total	5	452	452	732	384	10	9
Volume Left	5	0	0	0	0	10	0
Volume Right	0	0	0	0	18	0	9
cSH	621	1700	1700	1700	1700	98	473
Volume to Capacity	0.01	0.27	0.27	0.43	0.23	0.10	0.02
Queue Length 95th (m)	0.2	0.0	0.0	0.0	0.0	2.5	0.4
Control Delay (s)	10.8	0.0	0.0	0.0	0.0	45.9	12.8
Lane LOS	B					E	B
Approach Delay (s)	0.1			0.0		30.3	
Approach LOS						D	

Intersection Summary			
Average Delay	0.3		
Intersection Capacity Utilization	41.8%	ICU Level of Service	A
Analysis Period (min)	15		

D. Preliminary Environmental Impact Assessment

NORTH OF SHELLARD LANE NEIGHBOURHOOD AND RECREATION PLAN

Preliminary Environmental Impact Assessment

Prepared for

City of Brantford

Prepared by

PLAN B Natural Heritage

JUNE 2011

NORTH OF SHELLARD LANE NEIGHBOURHOOD AND RECREATION PLAN

prepared by:

Brad D. Bricker, M.Sc., Certified Senior Ecologist (ESA)

JUNE 2011

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1.0 INTRODUCTION

1.1 Study Area and Background

The following preliminary environmental impact assessment (EIA) has been prepared in conjunction with a proposed Neighbourhood and Recreation Plan for the North of Shellard Lane planning area in the City of Brantford, Ontario (Refer to Figure 1 for a key map of the study area). The study area is approximately 199 ha in size and can be described as a mosaic of agricultural land interspersed with field border hedgerows, cultural woodlands and thickets, deciduous woodlots, drainage swales, and forest and wetland communities associated with the D'Aubigny Creek riparian corridor. The D'Aubigny Creek valley supports a coldwater fishery and a provincially significant wetland complex. The valley corridor provides a linkage connection between the D'Aubigny Creek Swamp ESA to the southwest of the study area and the Grand River valley to the northeast.

1.2 Policy Context

In 2008, the City of Brantford completed a Secondary Plan for Southwest Brantford, which is an area of approximately 400 ha west of Conklin Road, north and south of Shellard Lane. The West of Conklin Secondary Plan provides detailed land use plans and policies for development within this area and has been incorporated into the City of Brantford Official Plan under Official Plan Amendment (OPA) 144 (City of Brantford 2010a).

A policy in OPA 144 requires that a neighbourhood plan be completed before development applications can be approved for this area (City of Brantford 2010b). The proposed land use within the study area includes the North of Shellard Lane Neighbourhood (163 ha) and a community park/recreation centre (36 ha).

1.3 Study Purpose

The purpose of this EIA is to address the environmental policy requirements of the Provincial Policy Statement (Natural Heritage policies), the City of Brantford Official Plan, the Southwest Brantford West of Conklin Secondary Plan policies, and the Grand River Conservation Authority Regulations/Guidelines. The EIA provides the following information:

- A description and evaluation of the biophysical resource features within the study area based largely on existing background information and supplementary field data;
- Field confirmation of natural area boundaries, buffers and linkages;
- A description of the development proposal;
- Identification of opportunities/constraints for future development;

- An evaluation of potential impacts for future development on core natural areas and linkage functions; and,
- Recommended mitigation/design measures, including buffers/setbacks to reduce development related impacts, protect sensitive environmental features and achieve habitat enhancement.
- Additional information, field inventories, and studies required at the development application stage.

1.4 Study Methodology

The following tasks were completed as part of the EIA:

- Review of background reports and supporting technical studies;
- Consultation with GRCA staff;
- Review of aerial photography, topographic mapping, soils and physiographic mapping;
- Field investigations (late summer/early fall) to document existing conditions and confirm opportunities/constraints to development;

  - Ecological Land Classification
  - Hedgerow tree inventory
  -Wildlife habitat evaluation
  - Field confirmation (staking, flagging) of natural area boundaries (wetlands, woodlands) with GRCA staff and follow-up surveying by City of Brantford Ontario Land Surveyor (November/December 2010, May 2011)

2.0 EXISTING CONDITIONS

A detailed natural heritage inventory and analysis of the subject lands was previously completed as part of the West of Conklin Secondary Plan, which forms the basis for the natural heritage system proposed herein for the North of Shellard Neighbourhood Plan. Additional information on the environmental characteristics of the study area can be found in the *Natural Heritage Existing Conditions and Assessment Report* (LGL Limited 2007). This document contains a detailed overview of the vegetation, wildlife and fisheries characteristics of the study area, and adjacent lands.

In light of the extensive background information which exists for the study area, as documented in the LGL (2007) report, the EIA investigation for this planning exercise has been "scoped" in nature with an emphasis on field delineation (staking, surveying) of the natural heritage system features, buffer confirmation, and identification of key environmental considerations that will require further detailed investigation (e.g. hydrogeology), as part of a draft plan of subdivision application or the detailed design for the sports field complex.

The existing conditions within the study area are mapped on Figure 2.

2.1 Physiography and Soils

The study area is located within the Norfolk Sand Plain physiographic region. This region is wedge-shaped, curving along Lake Erie, tapering northward to Brantford along the Grand River (Chapman and Putnam 1984). The Norfolk Sand Plain is a region that contains sands and silts deposited as a delta in the glacial Lakes Whittlesey and Warren (Chapman and Putnam 1984). As a result of this physiographic characteristic, the study area is located within a relatively flat to gently rolling landscape (LGL 2007).

In the *Soils of Brant County* (Acton 1989), the soils have not been mapped and have only been identified as "Urban Land", which includes residential, industrial and recreational areas. Prior studies (ESG 2001, LGL 2007) have identified the soils of the surrounding area as Brant (silt loam-well drained), Brantford (silty clay loam-moderately well drained), Beverly (silty clay loam-imperfectly drained) and Toledo (silty clay loam-poorly drained). The agricultural fields within the study area, in particular the imperfectly to poorly drained areas, have been extensively tile drained to permit cropping. The imperfectly to poorly drained areas generally coincide with the low-lying depressions and hollows associated with the rolling topography.

The topography of the study area is gently rolling and undulating, with an overall slope to the north and west, towards D'Aubigny Creek. Areas of steeper sloping topography occur in the northeast section of the study area and along the D'Aubigny Creek valley (refer to Figure 7).

2.2 Aquatic Resources

The study area is located within the D'Aubigny Creek subwatershed, which has a catchment size of 16 km^2 (LGL 2007). Within the North Shellard area, there are two main drainage features, D'Aubigny Creek and Tributary E. Two farmed through minor swales occur in the study area, which conveys drainage from the lands to the south of Shellard Lane.

D'Aubigny Creek

The main branch of D'Aubigny Creek provides the largest contiguous block of natural vegetation within the study area, and originates on part of the Moffat Moraine and flows 6.3 km to the Grand River (LGL 2007). D'Aubigny Creek is a permanent coldwater stream that supports a variety of fish species including habitat for brook trout (*Salvelinus fontinalis*), brown trout (*Salmo trutta*) and rainbow trout (*Oncorhynchus mykiss*).

Previous studies indicate that D'Aubigny Creek receives groundwater contributions, particularly from the sand and gravel deposits to the northwest (LGL 2007). Protection of the groundwater recharge/discharge regime within the study area and larger landscape setting is of paramount importance to the protection of the ecological integrity and function of the D'Aubigny Creek ecosystem.

In the *Southwest Brantford West of Conklin Road Secondary Plan Natural Features Assessment* (2007), LGL Limited verified that a dense stream canopy occurs along the main creek channel, and that riffle and pool habitats represented less than 40% of the total habitat (dominated by flats and runs). Stream width along the main channel varied between 1.8 to 4.5 m.

Tributary E

Tributary E, a tributary to D'Aubigny Creek located along the eastern edge of the study area, supports a seasonal warm water fish community. The tributary is intermittent with a poorly defined channel associated with dense growth of reed canary grass. Wetlands associated with Tributary E are part of the D'Aubigny Creek Swamp Provincially Significant Wetland (PSW).

An intermittent drainage swale is associated with the central woodlot/wetland. The southern extent of the swale is farmed/cropped through to Shellard Lane. The northern section is intact and conveys seasonal runoff to the main channel of D'Aubigny Creek. At the western end of the study area, a minor, farmed through drainage swale also conveys runoff to D'Aubigny Creek. A PSW feature on the south side of Shellard Lane outlets to the swale.

The topography of the study area is rolling with numerous hollows/depressions. Imperfectly to poorly drained soils occur in the lower lying portions of the agricultural fields and as result they have been tiled drained to permit farming. The outlets of the tile drains have caused erosion in places, as well as seasonal wet areas along the fringes of the wetlands. Significant erosion was observed at the upper end of the westerly drainage swale, in conjunction with an existing tile drain outlet.

2.2.1 Aquatic Species at Risk

The table below (Table 1) represents the aquatic species at risk that have been identified through the Ministry of Natural Resources (MNR) Natural Heritage Information Centre (NHIC) Biodiversity Explorer database. The occurrences are mapped in 1 km x 1km squares and species are represented for squares 17NH57_53, 17NH57_54, 17NH57_63, and 17NH57_64.

Table 1: Biodiversity Explorer Species Element Occurrence Search (Squares 17NH57_53, 17NH57_54, 17NH57_63 and 17NH57_64)

Element Occurrence	Common Name	Scientific Name	UTM (E)	UTM (N)	S RANK	MNR Status	COSEWIC Status	Date
32107	Greater Redhorse	*Moxostoma valenciennsi*	557000	4777000	S3			1995-07-08

Legend
SRANK S3: Vulnerable

The Greater Redhorse, a native warmwater fish species, can be found within moderate to swift current riffles, runs and pools of medium to large rivers with clear water and substrates of gravel, cobble or boulders (Page and Burr 1991). This species has been designated as “S3-Vulnerable”, which indicates that there are often 80 or fewer populations and that widespread declines or other factors have made this species vulnerable to extirpation.

This elemental occurrence was most likely reported from the Grand River, where this species has been previously recorded.

2.3 Terrestrial Resources

2.3.1 Vegetation Communities and Flora

Ecological Land Classification (ELC) was completed for the Southwest Brantford Secondary Plan area in 2007 by LGL Limited. The vegetation communities observed included FOD5 Dry-Fresh Sugar Maple Deciduous Forest Ecosite, FOD7 Fresh-Moist Lowland Deciduous Forest Ecosite, Cultural Communities and Wetland Communities. Refer to Figure 2 for a map of the ELC communities. A checklist of plant species observed within the study area can be found in the *Natural Heritage Existing Conditions and Assessment Report* (LGL Limited 2007).

The study area can be characterized as a mosaic of cultivated fields on rolling land, interspersed with hedgerows, a small remnant woodlot, the D'Aubigny Creek valley (mix of upland forest and wetlands) and Tributary E. Wetlands associated with the D'Aubigny Creek corridor include swamp (mixed, deciduous), thicket swamp (willow, dogwood), and marsh (cattail, reed canary grass). Terrestrial (forest) and cultural communities also occur along the riparian corridors of both Tributary E and D'AubignyCreek.

ELC Communities

Forest Communities

<u>FOD5 Dry-Fresh Sugar Maple Deciduous Forest Ecosite</u>

Several Sugar Maple (*Acer saccharum ssp. saccharum*) dominant forest communities occur south of the abandoned railway line, along upland valley slopes and tableland fringe areas. Sugar maple is the dominant species with American Beech (*Fagus grandifolia*), Red Oak (*Quercus rubra*), Hickories (*Carya* spp.) and Black Cherry (*Prunus serotina*) as frequent associates. Other species present in the canopy layer include White Elm (*Ulmus americana*), Pignut Hickory (*Carya glabra*), Bitternut Hickory (*Carya cordiformis*), Butternut (*Juglans cinera*), Black Maple (*Acer saccharum ssp. nigrum*), Black Cherry (*Prunus serotina*) Slippery Elm (*Ulmus rubra*), Green Ash (*Fraxinus pennsylvanica*), Pincherry (*Prunus pensylvanica*), and Alternate-leaved Dogwood (*Cornus alternifolia*).

There is evidence of past livestock grazing in the forest communities. Groundcover within the forests is typically sparse and dominated by invasive Garlic Mustard (*Alliaria petiolata*), Yellowish Enchanter's Nightshade (*Circaea lutetiana ssp. canadensis*), with scattered Spotted Crane's-bill (*Geranium maculatum*), Running Strawberry-bush (*Euonymus obovata*), and Upright Yellow Wood-sorrel (*Oxalis stricta*). Intact, diverse native plant communities occur in less disturbed portions of the forest blocks, particularly on the north side of the rail trail.

<u>FOD7 Fresh-Moist Lowland Deciduous Forest Ecosite</u>

These lowland forest communities occur along moist bottomland and swale systems associated with the D'Aubigny Creek corridor and Tributary E. Species within this ecosite include White Elm, Black Walnut (*Juglans nigra*), Basswood (*Tilia americana*), Ash (*Fraxinus spp.*), Shagbark Hickory (*Carya ovata*), Black Willow (*Salix nigra*), Bur Oak (*Quercus macrocarpa*), Swamp White Oak (*Quercus bicolor*). Hawthorns (*Crataegus spp.*) strongly dominate the shrub layer in some places, which is an indicator of past livestock grazing.

Cultural Communities

Cultural communities (i.e. meadows, thickets, woodlands and hedgerows) are interspersed throughout the study area, mainly in association with field borders and former farmsteads. These communities are dominated by early successional tree and shrub species, and old field meadow groundcovers. Typical species present include Hawthorn, Buckthorn (*Rhamnus cathartica*), Brambles (*Rubus spp.*), Dogwoods, White Elm, Green Ash, Manitoba Maple and Basswood. Old field groundcovers consist of goldenrods/asters (*Solidago spp., Aster spp.*) and forage grasses (*Phleum pratense, Bromus inermis, Dactylis glomerata, Poa spp*).

Hedgerows within the study area are comprised of a mix of immature to mature Sugar Maple, Basswood, White Elm, Red Oak, White Ash, Black Walnut, Black Cherry, and Shagbark Hickory. Typical shrubs present include hawthorn, buckthorn, brambles, chokecherry, and apple/pear (*Malus spp.*).

Typical ornamental tree and shrub plantings occur in association with the existing residences along Shellard Lane.

Wetland Communities

Wetland communities present along the main branch of D'Aubigny Creek include SWM4-1 (White Cedar-Hardwood Organic Mixed Swamp), SWD1-1 (Swamp White Oak Mineral Deciduous Swamp), SWD2-1 (Black Ash Mineral Deciduous Swamp), SWD4-1 Willow Mineral Deciduous Swamp), SWD5-1 (Black Ash Organic Deciduous Swamp) and MAM2 (Mineral Marsh) (LGL 2007).

SWM4-1 White Cedar-Hardwood Organic Mixed Swamp

Located on the north side of the rail trail (outside the study area), this ELC community is dominated by White Cedar (*Thuja occidentalis*), Black Willow and Yellow Birch (*Betula alleghaniensis*), with Black Ash (*Fraxinus nigra*), White Elm, Sensitive Fern (*Onoclea sensibilis*), Skunk Cabbage (*Symplocarpus foetidus*), Northern Bugleweed (*Lycopus uniflorus*) and grasses (e.g. *Glyceria striata*) and sedges (*Carex spp.*).

SWD1-1 Swamp White Oak Mineral Deciduous Swamp

The canopy consists of Swamp White Oak with White Elm. The understorey contains Winterberry (*Ilex verticillata*), Spicebush (*Lindera benzoin*) and Poison Ivy (*Rhus rydbergii*). Ground cover contains a mixture of Wood Nettle (*Laportea canadensis*), Bitter Nightshade (*Solanum dulcamara*), Cinnamon Fern (*Osmunda cinnamomea*) and Marsh Fern (*Thelypteris palustris*).

SWD2-1 Black Ash Mineral Deciduous Swamp

These communities are mostly associated with secondary tributaries to the main D'Aubigny creek. The canopy and understorey is dominated by Black Ash with White Elm as a frequent associate. Ground cover species present include Sensitive fern, Skunk Cabbage and Northern Bugleweed.

SWD4-1 Willow Mineral Deciduous Swamp

The canopy consists primarily of Black Willow and Yellow Birch with Bitternut Hickory. The shrub layers are dominated by Nannyberry (*Viburnum lentago*) and Wild Red Raspberry (*Rubus idaeus ssp. melanolasius*). Spotted Touch-me-not (*Impatiens capensis*), Devil's Beggar-ticks (*Bidens frondosa*) and grasses and sedges are the dominant ground cover within the community.

SWD5-1 Black Ash Organic Deciduous Swamp

This ELC community can be found along the main branch of D'Aubigny Creek. The canopy and understorey is dominated by Black Ash with frequent White Elm. Ground cover species present include Sensitive fern, Skunk Cabbage, and Northern Bugleweed.

MAM2 Mineral Meadow Marsh

The mineral meadow marsh communities are mainly associated with the secondary tributaries of D'Aubigny Creek, located south of the abandoned railway lines, including Tributary E. Species within this marsh include Reed Canary Grass, Common Reed (*Phragmites australis*), Common Cattail (*Typha latifolia*), Canada Goldenrod (*Solidago canadensis*), New England Aster (*Aster novae-angliae*), Purple Loosestrife (*Lythrum salicaria*), Joe-pye-weed, Boneset (*Eupatorium perfoliatum*), and Bitter Nightshade. These wetland pockets have been complexed as part of the D'Aubigny Creek Swamp PSW.

2.3.2 Designated and Regulated Natural Areas

Wetlands are highly productive and biologically diverse natural features. A Provincially Significant Wetland (PSW) is a designation given to those wetlands that are identified as being the most valuable by the province. A PSW is defined as "any evaluated wetland with a total of more than 600 points or more than 200 points in either the Biological Component or the Special Features Component" (NPCA 2007). Provincial policy indicates that development cannot occur within a PSW, however development may be permitted on adjacent lands if it has been demonstrated that there will be no negative impacts on wetland features or wetland functions.

The wetlands within the study area are part of the D'Aubigny Creek Swamp Provincially Significant Wetland (PSW) Complex. Portions of the PSW complex are found within the study area, generally corresponding with D'Aubigny Creek and its tributaries. The wetlands consist of cattail and reed canary grass marsh, willow/dogwood thicket swamp, and deciduous/mixed swamp. The upland and wetland communities associated with the D'Aubigny Creek valleylands are part of a larger core natural area and corridor that provides a linkage connection between the D'Aubigny Creek Swamp ESA to the south and the Grand River valley to the northeast.

D'Aubigny Creek Swamp PSW

As noted above, the wetlands within the study area are part of the D'Aubigny Creek Swamp PSW. The wetland features are associated with floodplain of D'Aubigny Creek as well as Tributary E and the lower reaches of the central drainage swale (refer to Figure 6). The wetland features comprise marsh, shrub thicket swamp and treed swamp vegetation communities. They are sustained by a combination of surface water runoff and groundwater discharge, including inputs from agricultural tile drains (e.g. Tributary E, central swale and west swale). Given the imperfectly to poorly drained condition of the low lying portions of the agricultural fields, tile drains were installed to improve drainage. These tile drains contribute, in part, to the overall hydrology of the PSW features, as well as baseflow within D'Aubigny Creek and Tributary E. Maintenance of the pre-development contributions of the tile drainage is important for maintaining the hydrology of the PSW features and their associated plant, wildlife and fisheries habitat functions.

From a broader landscape perspective, the key groundwater discharge zone which sustains baseflow in D'Aubigny Creek and the associated floodplain/riparian zone wetlands is located to the north of the study area, in association with the sand and gravel deposits south of Pleasant Ridge Road and the rail trail. The headwaters of several coldwater tributaries to D'Aubigny Creek occur in this area. PSW features are associated with the groundwater discharge zones along the length of these tributaries, as well as in the main floodplain of D'Aubighy Creek. As noted above, the PSW features within the North of Shellard Lane study area are confined to a narrow band along the south edge of D'Aubigny Creek, the lower reaches of the central swale and Tributary E. These wetland features are maintained by a combination of overland surface drainage, ground discharge and tile drain outlets.

To provide adequate protection for the PSW features it will be necessary to maintain the overall pattern and volume of surface water and groundwater discharge to the wetlands. A hydrogeological impact analysis including a pre-development and post-development water balance calculation, will be required as part of the detailed design for the Neighbourhood Park and future draft plans of subdivision. Locating and mapping the tile drain outlets (and their catchment areas) within the study area should also be included as part of the hydrogeological analysis. Given the rolling topography of the study area it will be important to identify areas of groundwater recharge (closed depressions) and slopes which convey overland flow to the wetlands (e.g. along the western edge of Tributary E). Opportunities exist for creating wetland habitats at existing tile drain outlets (or new stormwater facility outlets) as part of the overall development of the study area. Potential areas where wetland creation could be considered generally coincide with existing tile drain outlets or low lying areas that are currently farmed.

GRCA Regulation 150/06

The GRCA previously regulated watercourses and flood/fill areas under the *Fill, Construction and Alteration to Waterways Regulation (Regulation 149/90)*. Subsequent to May 8, 2006, this regulation was superseded by Regulation 150/06, referred to as the *Development, Interference with Wetlands and Alterations to Shorelines and Watercourses, Ontario Regulation 150/06*.

Schedule D in the Secondary Plan shows the areas regulated under Regulation 150/06 as the Environmental Protection Overlay (refer to Figure 6). Section 2 of the Regulation provides a description of areas requiring a permit for alteration or development. Under the Regulation, these areas include:

- River or stream valley plus 15 m from stable top of bank, or floodline; and,
- Wetlands, including 120 m from the edge of a PSW and 30 m from the edge of a non-PSW.

Minor watercourses, low lying areas, and erosion prone slopes are also covered under the Regulation.

Regulated areas require a permit from the Conservation Authority to proceed with any development. The regulated areas do not constitute a required buffer to the feature (i.e. a 120 m regulated zone around a PSW does not equal a 120 m buffer) but rather acts as a trigger for further detailed investigation to determine an appropriate setback and other mitigation measures to protect the feature.

2.3.3 Vegetation Species at Risk

Table 2 represents the terrestrial species at risk that have been identified through the MNR NHIC screening tool, Biodiversity Explorer. At least one of these species, Pignut Hickory (*Carya glabra*) was identified within the Sugar Maple forest unit south of the abandoned railway line during the investigations completed by LGL Limited in 2007.

Table 2: Biodiversity Explorer Species Element Occurrence Search (Squares 17NH57_53, 17NH57_54, 17NH57_63 and 17NH57_64)

Element Occurrence	Common Name	Scientific Name	UTM (E)	UTM (N)	S RANK	MNR Status	COSEWIC Status	Date
59690	Pawpaw	*Asimina triloba*	555000	4791000	S3			1891-08-04
33652	Fern-leaved Yellow False Foxglove	*Aureolaria pedicularia*	555000	4775000	S2?			1990-06-06
60296	Fern-leaved Yellow False Foxglove	*Aureolaria pedicularia*	555000	4764000	S2?			1888-08-19
2212	Pignut Hickory	*Carya glabra*	555000	4776000	S3			1989-09-19
2221	Pignut Hickory	*Carya glabra*	555000	4783000	S3			1960-05-27
65780	Pignut Hickory	*Carya glabra*	555000	4776000	S3			1990-06-06
21306	American Chestnut	*Castanea dentate*	550000	4780000	S2	END	END	1989-PRE
65781	Yellow Stargrass	*Hypoxis hirsute*	555000	4775000	S3			1990-06-06
33690	Biennial Guara	*Oenothera guara*	554000	4775000	S3			1992-09-21
65782	Hoary Puccoon	*Lithospermum canescens*	555000	4775000	S3			1990-06-06
60246	Soft-Hairy False Gromwell	*Onosmodium molle ssp. hipidissium*	559000	4775000	S2			1864-07
17261	Broad Beech Fern	*Phegopteris hexagonoptera*	551000	4768000	S3	SC	SC	1977-09-08
17273	Broad Beech Fern	*Phegopteris hexagonoptera*	559000	4778000	S3	SC	SC	1975-07-17
2150	Dwarf Chinquapin Oak	*Quercus prinoides*	555000	4778000	S2			1992-06-17
5399	Dwarf Chinquapin Oak	*Quercus prinoides*	553000	4778000	S2			1997-06-24
65779	Rue-Anemone	*Thalictrum thalictroides*	555000	4775000	S3			1990-06-06

Element Occurrence	Common Name	Scientific Name	UTM (E)	UTM (N)	S RANK	MNR Status	COSEWIC Status	Date
13015	American Columbo	*Fasera caroliniensis*	558000	4777000	S2	END	END	1930-07-11

Legend
SRANK S2: Imperilled; S2?: not ranked (may be Imperilled); S3: Vulnerable
Ministry of Natural Resources (MNR) Status-END: Endangered; SC: Special Concern
Committee on the Status of Endangered Wildlife in Canada (COSEWIC)- END: Endangered; SC: Special Concern

Butternut (*Juglans cinerea*) trees (n=3) were identified by PLAN B Natural Heritage along the south edge of a mature deciduous forest in the northeast corner of the study area (see Figure 2). Butternut is an endangered species, protected under the *Endangered Species Act*.

2.4 Wildlife Habitat and Communities

The D'Aubigny Creek corridor, consisting of wetland and upland habitat, is the key habitat feature within the study area. This corridor provides a large block of habitat for terrestrial and wetland wildlife species. The D'Aubigny Creek corridor also provides a key wildlife function by connecting to the Grand River valley (to the east) and the D'Aubigny Creek Swamp ESA (to the west). The largest blocks of habitat occur to the north and west of the study area, in association with sloping topography. MNR LIO mapping indicates the presence of deer wintering habitat along the D`Aubigny Creek corridor, in association with wetland areas.

Given the size, shape and connections among habitat patches, the study area supports a breeding bird community comprised of edge and habitat generalist species, wetland species and species with preference for forest interior-conditions. Mammals present in the study area include common species such as whitetail deer, coyote, red fox, striped skunk, raccoon, mink, eastern gray squirrel, eastern chipmunk, groundhog, beaver, muskrat, and meadow vole. The wetlands along the D`Aubigny Creek support a variety of common amphibians and reptiles, such as spring peeper, leopard frog, green frog, snapping turtle, midland painted-turtle, and garter snake.

Smaller features in the study area (i.e. remnant woodlot, hedgerows) that are linked to the main valley corridor also provide habitat for wildlife.

A complete list of wildlife species recorded from the study area can be found in the *Natural Heritage Existing Conditions and Assessment Report* (LGL Limited 2007). The results of the wildlife inventory completed in September 2010 are provided below.

2010 Wildlife Observations

Species of wildlife were recorded during site visits conducted on September 17 and 29, 2010. Since the survey period was fall migration/post-breeding season for birds, determining the breeding bird community was not possible.

Birds

A total of 19 species of birds were recorded during the visits (see table below). All of the species observed, except White-crowned Sparrow (migrant), were recorded breeding in the 10x10 km square (17NH57) during the Second Ontario Breeding Bird Atlas project (Bird Studies Canada et. al. 2006). The study area occupies approximately 1 km square within the larger 10x10 km square 17NH57. None of the species observed are considered Species-at-Risk by federal and provincial jurisdictions.

Bird species observed during September 17 and 29, 2010 site visits

Common Name	Scientific Name
Wild Turkey	*Meleagris gallopavo*
Turkey Vulture	*Cathartes aura*
Red-tailed Hawk	*Buteo jamaicensis*
Red-bellied Woodpecker	*Melanerpes carolinus*
Downy Woodpecker	*Picoides pubescens*
Blue Jay	*Cyanocitta cristata*
American Crow	*Corvus brachyrhynchos*
Tree Swallow	*Tachycineta bicolor*
Black-capped Chickadee	*Poecile atricapillus*
White-breasted Nuthatch	*Sitta carolinensis*
House Wren	*Troglodytes aedon*
American Robin	*Turdus migratorius*
Gray Catbird	*Dumetella carolinensis*
European Starling	*Sturnus vulgaris*
Common Yellowthroat	*Geothlypis trichas*
White-crowned Sparrow	*Zonotrichia leucophrys*

Northern Cardinal	*Cardinalis cardinalis*
Red-winged Blackbird	*Agelaius phoeniceus*
American Goldfinch	*Spinus tristis*

Two Wild Turkeys were observed and their tracks were readily seen in the interface between the agricultural fields and adjacent woodlands. The central woodlot appears to be used as a regular roosting area for turkeys.

Species-at-Risk

During the Second Ontario Breeding Bird Atlas project (2001-2005), a total of 8 species of birds classified as Species-at-Risk were recorded within the 17NH57 10x10 km square (see table below). Fifty percent of these species were recorded only once during the five year observation period. Suitable habitat for these species within the study appears absent or limited to the D'Aubigny Creek corridor and possibly the central woodlot/wetland. In-season surveys conducted in June, following standard protocol, would be required to confirm the presence/absence of Species-at-Risk and other species of breeding birds.

Bird Species-at-Risk observed within 10x10 km square (17NH57) during the Second Ontario Breeding Bird Atlas project (2001-2005)

Species-at-Risk recorded in Ontario Breeding Bird Atlas Square 17NH57 (2001-2005)				
Common Name	Scientific Name	Number of years observed	Federal Status	Provincial Status
Common Nighthawk	*Chordeiles minor*	3 of 5 years	THR	SC
Chimney Swift	*Chaetura pelagica*	5 of 5 years	THR	THR
Red-headed Woodpecker	*Melanerpes erythrocephalus*	1 of 5 years	THR	SC
Acadian Flycatcher	*Empidonax virescens*	1 of 5 years	END	END
Golden-winged Warbler	*Vermivora chrysoptera*	1 of 5 years	THR	SC
Cerulean Warbler	*Dendroica cerulea*	1 of 5 years	END	SC
Canada Warbler	*Wilsonia canadensis*	2 of 5 years	THR	SC
Bobolink	*Dolichonyx oryzivorus*	5 of 5 years	THR	THR

END = Endangered
THR = Threatened
SC = Special Concern

Mammals

Only one mammal species, Eastern Gray Squirrel (*Sciurus carolinensis*), was observed during the surveys. However, tracks of Raccoon (*Procyon lotor)* and White-tailed Deer (*Odocoileus virginianus*) were observed throughout the study area. Tracks of White-tailed Deer were concentrated along the interface between the woodlands and the agricultural fields. In some areas, there was evidence of extensive corn crop damage from deer. Groups of 30 deer have been observed in the fields in the past by the tenant farmer on the City owned lands (Pers. Comm.).

The healthy population of White-tailed Deer and Wild Turkey within the study area has apparently attracted hunters to the property. In the central woodlot, and along the upland portions of the D'Aubigny Creek corridor, spent shotgun shells are scattered throughout.

Reptiles/Amphibians

No reptiles or amphibians were located during the September 2010 site visits. Spring Peeper, American Toad and Leopard Frog were recorded during an April 2011 site visit. The largest concentration of calling frogs was recorded along the D'Aubigny Creek corridor, the central woodlot/wetland, and Tributary E. The results of the April 2011 frog call monitoring are provided below. The location of the monitoring stations is shown on Figure 8.

2.4.1 Wildlife Species at Risk

A search of the MNR NHIC Biodiversity Explorer database indicates that there are no wildlife species at risk identified within the study area.

3.0 OPPORTUNITIES AND CONSTRAINTS

The study area is mainly comprised of agricultural land on rolling, hummocky topography. Natural environment features are mainly confined to the D'Aubigny Creek corridor, Tributary E and a small mosaic patch of forest, wetland and hedgerows located in the centre of the study area.

The key elements of the natural heritage system for the North of Shellard Neighbourhood plan are as follows:

- D'Aubigny Creek;
- Tributary E;
- D'Aubigny Creek PSW;
- Floodplain areas;
- Upland forest and cultural vegetation contiguous with the D'Aubigny Creek riparian corridor;
- Central woodlot/wetland and hedgerow connections to D'Aubigny Creek and Tributary E;
- Drainage swale and hedgerow connection between PSW south of Shellard Lane and D'Aubigny Creek corridor; and,
- Buffers to environmental features.

These features are mapped on Figure 3, and include the surveyed wetland and woodlot boundaries from the site walks conducted with GRCA staff in December 2010 and May 2011.

The recommended natural heritage system is shown in Figure 4. The system incorporates minimum 30 m buffers (as per the recommendations in the West of Conklin Secondary Plan) from the D'Aubigny Creek corridor (as defined as the greater of stream channel, wetland boundary or dripline of contiguous upland vegetation). A 10 m dripline buffer from the edge of the central woodlot and hedgerows has also been incorporated into the natural heritage system (as per Secondary Plan policies). Floodplain areas have also been taken into account in determining the location of the natural heritage system. Although a 15 m warm water fishery setback was previously recommended for Tributary E, for consistency a 30 m setback was applied to this watercourse, and the D'Aubigny Creek system as a whole. The application of a 30 m setback for Tributary E has no impact on the overall natural heritage system, as the floodplain and 30 m wetland buffer are located beyond the stream channel setback. Stream channel setbacks of 30 m are typically applied to both cold and warm water systems.

Figure 4 shows the limits of the natural heritage features, the enhancements to core environmental features (buffers and floodplain areas – currently farmed), and the overall natural heritage system line, which forms the framework for the proposed neighbourhood concept plan. Areas identified by GRCA during the May 2011 site walk where larger buffers (i.e. greater than 30 m) may be required coincide with PSW features associated with Tributary E and the central woodlot/wetland, as well as areas of high erosion along the D'Aubigny Creek corridor (e.g. NW corner of study area). The intent of the larger buffers is to capture low lying areas that are inundated with water during the spring, and to provide appropriate setbacks from erosion prone slopes.

It should be noted that depending on the results of in-season field surveys conducted as part of an EIS at the development application stage, additional setbacks from natural heritage features may be required, particularly along the residential/natural heritage system interface. The buffers/setbacks proposed as part of this Preliminary EIA are based on available background information and field work completed in the late-summer/early fall of 2010.

4.0 CONCEPT PLAN OVERVIEW & IMPACT ANALYSIS

The North of Shellard Lane Neighbourhood and Recreation Plan consists of a mix of low and medium density housing, retail/commercial, school, parkettes, stormwater management facilities, and a major sports complex facility with playing fields. Access to the neighbourhood will be provided via three entrance points to Shellard Lane. The neighbourhood will be serviced by an extension of Municipal services along Shellard Lane (water main, sanitary sewer). The extension of the services will require a crossing of Tributary E using directional boring technology to avoid impacts to the watercourse and associated floodplain and wetland (PSW) habitat.

The concept plan is based on the natural heritage system framework presented in Figure 4, which is based on a staking exercise conducted with GRCA staff in December 2010 and May 2011. Buffers were applied to the surveyed wetland and woodland/hedgerow boundaries to determine the limits of development. The sports complex integrates a remnant woodlot and field border hedgerows, while maintaining and enhancing the connection to the main D'Aubigny Creek valley. An overlay of the concept plan and the natural heritage system is shown on Figure 5.

Given the significance and sensitivity of the natural environment features within the study area, appropriate stormwater and groundwater management measures are recommended to maintain and enhance water quality, sustain stream baseflow/temperature and protect wetland hydrology. Low impact development measures for stormwater management such as bio-swales, at-source infiltration of runoff, wetland storm ponds, and infiltration/cooling trench outlets, are recommended to protect the aquatic and wetland components of the natural heritage system. Naturalization of the buffers and storm ponds with native plant species is recommended to enhance the function and integrity of the natural heritage system and increase its resilience to development of the landscape.

The key elements of the plan with respect to environmental protection are as follows:

- Control of post-development runoff to pre-development levels with Enhanced (former Level 1) stormwater management facilities, constructed as wetland or hybrid type storm ponds;
- Cooling of runoff through a combination of outlet design (e.g. buried stone trench) and shade plantings along the receiving channel;
- Minimizing cut/fill requirements to reduce alterations to surface drainage and infiltration;
- Low Impact Development (LID) stormwater management measures such as landscaped bio-swales, perforated drain tiles, permeable pavement systems, rainwater collection cisterns for irrigation, and minimal or no grade changes within buffer areas;
- Naturalization of buffers and parkland with common, native species indicative of the surrounding landscape and existing site conditions;
- Low level lighting for sports fields and trails adjacent to natural areas;
- Minimal hedgerow tree removal to accommodate road access to the sports fields;
- Reduced length of trail connections to the existing rail trail – trail access points occur in areas closet to the rail trail and avoid the more sensitive wetland/upland habitats. Final trail locations should be reviewed in the field with a qualified ecologist (at the EIS stage) to determine the most appropriate route from a habitat impact and restoration perspective.

Other urban design criteria incorporated into the plan to promote environmental protection include the use of single loaded roads adjacent to natural areas, positioning of parkettes and storm ponds between residential areas and features to be protected, large lots to promote at-source infiltration of runoff, and avoidance of areas with steep/sloping topography.

Given that the existing agricultural fields are tile drained with outlets to the wetlands and ultimately D'Aubigny Creek, it will be important to locate/map these features at the EIS stage, and determine the most appropriate mitigation measures for maintaining the pre-development conditions within the wetlands and watercourse. Options for addressing this area of concern include establishing small, constructed wetlands at existing tile drain outlets and maintaining the pre-development catchment area that supports the wetland/watercourse feature in question. Potential areas where wetland creation should be considered include low lying areas (i.e. currently farmed) that flank the PSW as well as existing tile drain outlets.

Buffers

As noted above, a 30 m buffer has been applied to the core environmental features within the study area. The concept plan has been developed to respect the natural heritage features and the buffers. With the exception of the access to the sports fields, no roads or lots are proposed within buffer areas.

Compatible uses within buffer areas include stormwater management facilities (provided a minimum 10 m "no touch" buffer is maintained to the feature), trails and passive/active park uses, such as the edges or rear of a sports field. For the most part, the proposed concept plan fully respects the recommended natural heritage system buffers.

As noted above, larger buffers may be required in certain locations to accommodate areas of seasonal inundation with water (i.e. in the spring), sloping topography, and protection of the natural heritage system. In-season vegetation and wildlife surveys are recommended at the development application stage (EIS) to confirm and refine, where necessary, the buffers to the natural heritage system.

Tributary E Crossing

Horizontal directional boring is recommended for the Tributary E crossing to extend the municipal services. No disturbance to the creek or wetland vegetation should occur using this method. The warm water fishery timing window for construction (i.e. March 1st to July 1st) will apply for the creek crossing and any near-water work. If pumping of groundwater or surface water is required for the installation of the pipes, it should be pumped through a filter-bag prior to discharging to the grassed roadside ditch. The sending and receiving pits should be located outside of the GRCA Regulated Area. Excavated material from the directional boring should be removed from the site or contained with silt fencing in accordance with GRCA standards. Exposed soil or disturbed areas should be quickly re-seeded with a native meadow seed mix suitable to the GRCA.

The preferred location for the crossing of Tributary E is on the north side of Shellard Lane. If an open cut crossing of the watercourse is identified as the preferred approach for the extension of services, a detailed environmental inventory (fisheries, vegetation, and wildlife habitat) will be required to confirm existing conditions, potential impacts and mitigating measures. A fluvial geomorphological evaluation of the proposed crossing would also be required to determine the most appropriate means of restoring the stream channel to its pre-development condition.

Butternut

Three Butternut trees were observed along the southern edge of the forest community located in the northeast corner of the study area (see Figure 2). The trees are protected by a minimum 30 m buffer from the proposed sports field complex. Prior to site alteration, MNR staff will need to be contacted to determine if the proposed buffers and protection measures are appropriate. An evaluation of the health of the individual specimens will also need to be completed following the Butternut Health Assessment protocol. The assessment should be completed by a qualified Butternut health assessor.

Environmental Protection Strategy

The above noted environmental protection measures will be developed in greater detail as part of the individual EIS's to be submitted with a development application. Specific details related to the protection of stream baseflow in D'Aubigny Creek and Tributary E, wetland hydrology, and the features/functions of the overall natural heritage system will be provided in the EIS. The environmental protection strategy will be developed in conjunction with the results of the hydrogeological investigation, stormwater management plan, geotechnical studies related to slopes and top of bank, fluvial geomorphological analysis of storm pond outlets and receiving channels, and an analysis of the existing tile drain system, as it relates to sustaining wetland features and stream baseflow. In addition, the EIS will confirm the appropriateness of the proposed buffers and make adjustments, where necessary, to ensure adequate protection is provided to the natural heritage system. A key element of the EIS will be to provide recommendations for environmental stewardship and awareness for future residents of the community (e.g. through Homeowners Manual, interpretative signage, community involvement in monitoring and enforcement). Recommendations for the naturalization of the buffers, including fencing and signage, will be provided with the goal of augmenting/supplementing existing habitat and deterring public/pedestrian access into sensitive environmental areas. This will be particularly important for the proposed residential areas that abut the natural heritage system as well as the sports complex, and trail connections to the rail trail. Depending on the results of the in-season field work completed at the EIS stage, refinements to the development concept may be required to accommodate larger buffers/setbacks to provide long-term protection to the natural heritage system.

Follow-up Studies

The following studies will need to be completed as part of the next phase in the planning approval process for the Neighbourhood Plan (draft plan applications) and sports complex (detailed design):

- A detailed hydrogeological investigation and water balance analysis will be required to confirm the pre-development pattern/volume of infiltration, impacts of development, and proposed mitigation measures to maintain and/or enhance the groundwater recharge function of the site;
- Detailed stormwater management plans, including outlet cooling design, landscaping plan and performance monitoring program, for proposed storm ponds. Where necessary, a fluvial geomorphological analysis should be completed for the pond outlets to ensure that any downstream erosion concerns are not exacerbated. A key component of this analysis will be to identify and map the locations of tile drain outlets and determine the most appropriate means of maintaining the pre-development contribution to wetland hydrology and stream baseflow;
- In-season field inventories (vegetation, wildlife) within the proposed natural heritage system, including the proposed trail routes in natural areas (i.e. rail trail connections), to confirm opportunities/constraints, identify potential impacts and mitigating measures, including buffer/setback requirements and habitat compensation/restoration;
- Naturalization plans for buffer areas, floodplains (formerly farmed) and non-active portions of park uses;
- An EIS will be required for future draft plan of subdivisions. The study should demonstrate how the plans conform with the environmental protection and enhancement objectives for the Neighbourhood Plan, as outlined in the companion EIA;
- Overall environmental monitoring program to measure the effectiveness of the proposed mitigation/enhancement strategy and identify contingency actions (Adaptive Management Plan) to address unforeseen impacts and poor performance;
- Erosion and siltation control plan in accordance with the most stringent standards applied by the GRCA and City of Brantford for protecting D'Aubigny Creek and Tributary E; and,
- Future residents of the community should be informed of the significance/sensitivity of the natural environment and appropriate stewardship behaviour. This can be accomplished through a variety of ways including; interpretative signage at trail heads, homeowners manual, school programs, and trail/nature watch volunteers.

5.0 SUMMARY AND CONCLUSIONS

This preliminary environmental impact assessment (EIA) has been prepared in conjunction with a proposed Neighbourhood and Recreation Plan for the North of Shellard Lane planning area in the City of Brantford, Ontario. The study area is approximately 199 ha in size and can be described as a mosaic of agricultural land interspersed with field border hedgerows, cultural woodlands and thickets, deciduous woodlots, drainage swales, and forest and wetland communities associated with the D'Aubigny Creek riparian corridor. The D'Aubigny Creek valley supports a coldwater fishery and a provincially significant wetland complex and represents a core environmental feature. The valley corridor provides a linkage connection between the D'Aubigny Creek Swamp ESA to the southwest of the study area and the Grand River valley to the northeast.

The key elements of the natural heritage system for the North of Shellard Neighbourhood plan are as follows:

- D'Aubigny Creek;
- Tributary E;
- D'Aubigny Creek PSW;
- Floodplain areas;
- Upland forest and cultural vegetation contiguous with the D'Aubigny Creek riparian corridor;
- Central woodlot/wetland and hedgerow connections to D'Aubigny Creek and Tributary E;
- Drainage swale and hedgerow connection between PSW south of Shellard Lane and D'Aubigny Creek corridor; and,
- Buffers to environmental features.

The recommended natural heritage system for the study area incorporates minimum 30 m buffers (as per the recommendations in the West of Conklin Secondary Plan) from the D'Aubigny Creek corridor (as defined as the greater of edge of stream bank, wetland boundary or dripline of contiguous upland vegetation). A 10 m dripline buffer from the edge of the central woodlot and hedgerows has also been incorporated into the natural heritage system (as per Secondary Plan policies). Floodplain areas have also been taken into account in determining the location of the natural heritage system. For consistency a conservative setback of 30 m was applied to the Tributary E watercourse and the D'Aubigny Creek system as a whole.

The key elements of the concept plan with respect to environmental protection are as follows:

- Control of post-development runoff to pre-development levels with Enhanced (former Level 1) stormwater management facilities, constructed as wetland or hybrid type ponds;

- Cooling of runoff through a combination of outlet design (buried stone trench) and shade plantings along receiving channel;
- Minimizing cut/fill requirements to reduce alterations to surface drainage and infiltration;
- Low Impact Development (LID) stormwater management measures such as landscaped bio-swales, perforated drain tiles, permeable pavement systems, rainwater collection cisterns for irrigation, and minimal or no grade changes within buffer areas;
- Naturalization of buffers and parkland with common, native species indicative of the surrounding landscape and existing site conditions;
- Low level lighting for sports fields and trails adjacent to natural areas;
- Minimal hedgerow tree removal to accommodate road access to the sports fields; and,
- Reduced length of trail connections to the existing rail trail.

Overall, the proposed concept plan provides for a high level of environmental protection and enhancement through a combination of urban/park design, mitigation measures, and habitat restoration opportunities. Follow-up hydrogoelogical, geotechnical, fluvial geomorphology, and environmental impact studies (EIS) will be required for the draft plan of subdivision phase and the detailed design of the sports complex. These studied are required to address matters related to the protection of the surface water and groundwater regime, provincially significant wetlands, woodlands, coldwater fish habitat in D'Aubigny Creek, endangered species (Butternut), and the servicing crossing of Tributary E. Depending on the results of these detailed investigations, additional environmental protection measures, including increased buffers/setbacks, may be required to provide adequate protection to the natural heritage system.

6.0 REFERENCES

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Legend

Study Area

PLAN B Natural Heritage
Landscape Ecology & Natural Heritage Planning
176 Fellowes Crescent
Waterdown, ON
L0R 2H3

North of Shellard Lane
Neighbourhood & Recreation Plan
Study Area

Project #	2010-30	Figure # 1
Date	June 2011	
Scale	1 : 5,500	
Prepared By: JJJ	Verified By: BDB	

Legend

- Study Area
- Drainage Swale
- Ecological Land Classification Community Boundary
- Butternut (*Juglans Cinerea*) Locations
- FOD5-1 Dry-Fresh Sugar Maple Deciduous Forest Type
- FOD5-2 Dry-Fresh Sugar Maple-Beech Deciduous Forest Type
- FOD5-5 Dry-Fresh Sugar Maple-Hickory Deciduous Forest Type
- FOD7-4 Fresh-Moist Black Walnut Lowland Deciduous Forest Type
- CUT Cultural Thicket
- CUT1-4 Gray Dogwood Cultural Thicket Type
- CUW Cultural Woodland/Remnant Homestead
- SWD1-1 Swamp White Oak Mineral Deciduous Swamp Type
- SWD4-1 Willow Mineral Deciduous Swamp Type
- SWD5-1 Black Ash Organic Deciduous Samp Type
- MAM2 Mineral Meadow Marsh Ecosite
- MAM2-2 Reed Canary Grass Mineral Meadow Marsh Type
- MAS2-1 Cattail Mineral Shallow Marsh Type
- Ag Agricultural
- HR Hedgerow
- R Residential

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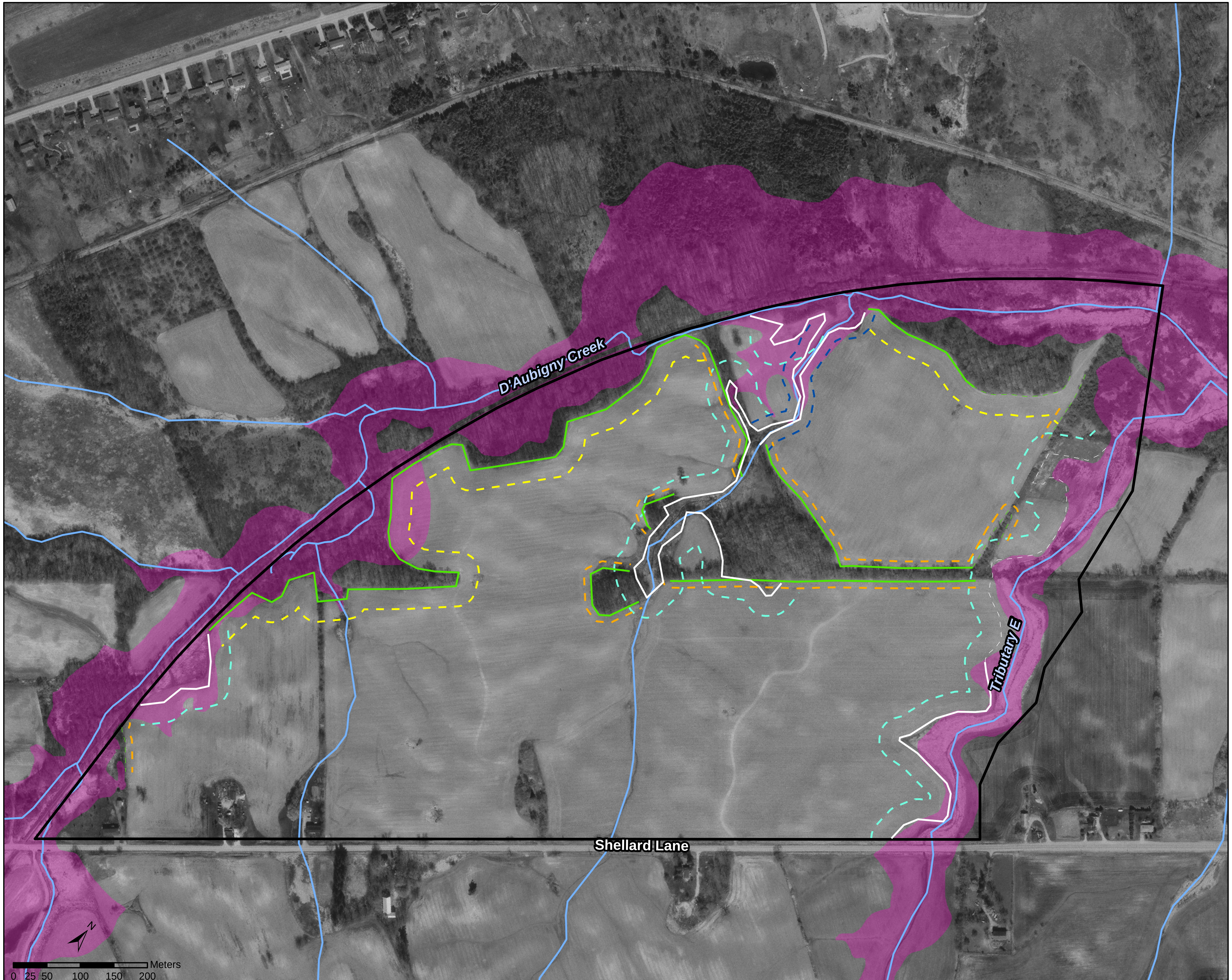
Waterdown, ON
L0R 2H3

North of Shellard Lane
Neighbourhood & Recreation Plan
Existing Conditions

Project #	2010-30
Date	June 2011
Scale	1 : 5,500
Figure #	2
Prepared By: JJJ	Verified By: BDB



Legend

- Study Area
- Dripline (as staked Nov. 25 and Dec. 15, 2010)
- Wetland Boundary (as staked Nov. 25 and Dec.15, 2010, with GRCA)
- Watercourse
- Estimated Dripline*
- Estimated Wetland Boundary*
- 10 m Dripline Setback
- 15 m Watercourse Setback
- 30 m Wetland Setback
- 30 m D'Aubigny Creek Corridor Setback
- Floodplain

* Estimations based on airphoto interpretation

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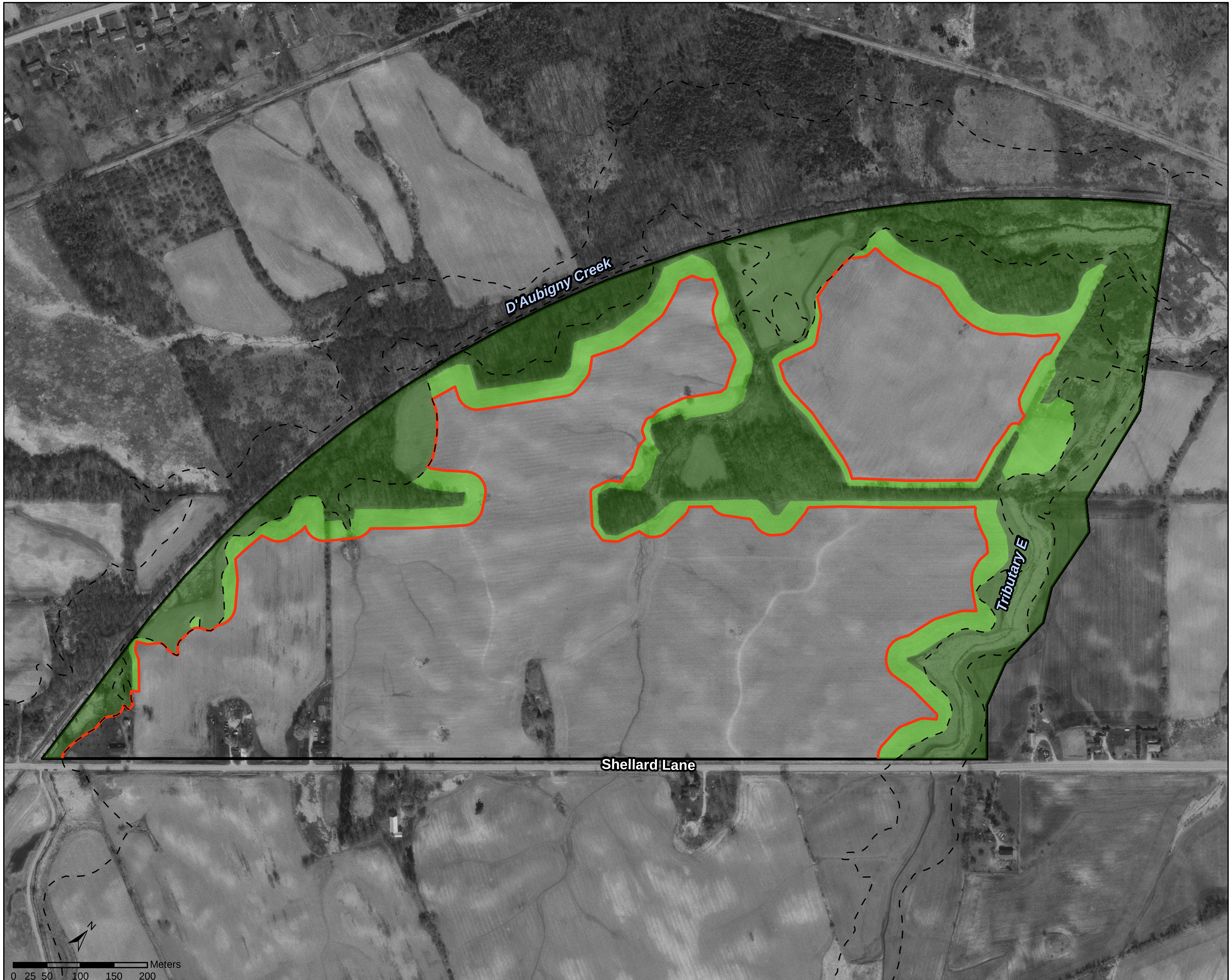
Waterdown, ON
L0R 2H3

North of Shellard Lane Neighbourhood & Recreation Plan

Opportunities and Constraints

Project #	2010-30	Figure #
Date	June 2011	3
Scale	1 : 5,500	
Prepared By: JJJ	Verified By: BDB	



Legend

- Study Area
- Natural Heritage System Boundary
- Floodline
- Core Natural Heritage Features
- Potential Restoration Area

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Waterdown, ON
L0R 2H3

North of Shellard Lane
Neighbourhood & Recreation Plan
Natural Heritage System

Project #	2010-30	Figure # 4
Date	June 2011	
Scale	1 : 5,500	
Prepared By: JJJ	Verified By: BDB	

Legend

- Study Area
- Natural Heritage System Boundary
- Core Natural Heritage Features
- Potential Restoration Area
- Floodline

PLAN B Natural Heritage
Landscape Ecology & Natural Heritage Planning
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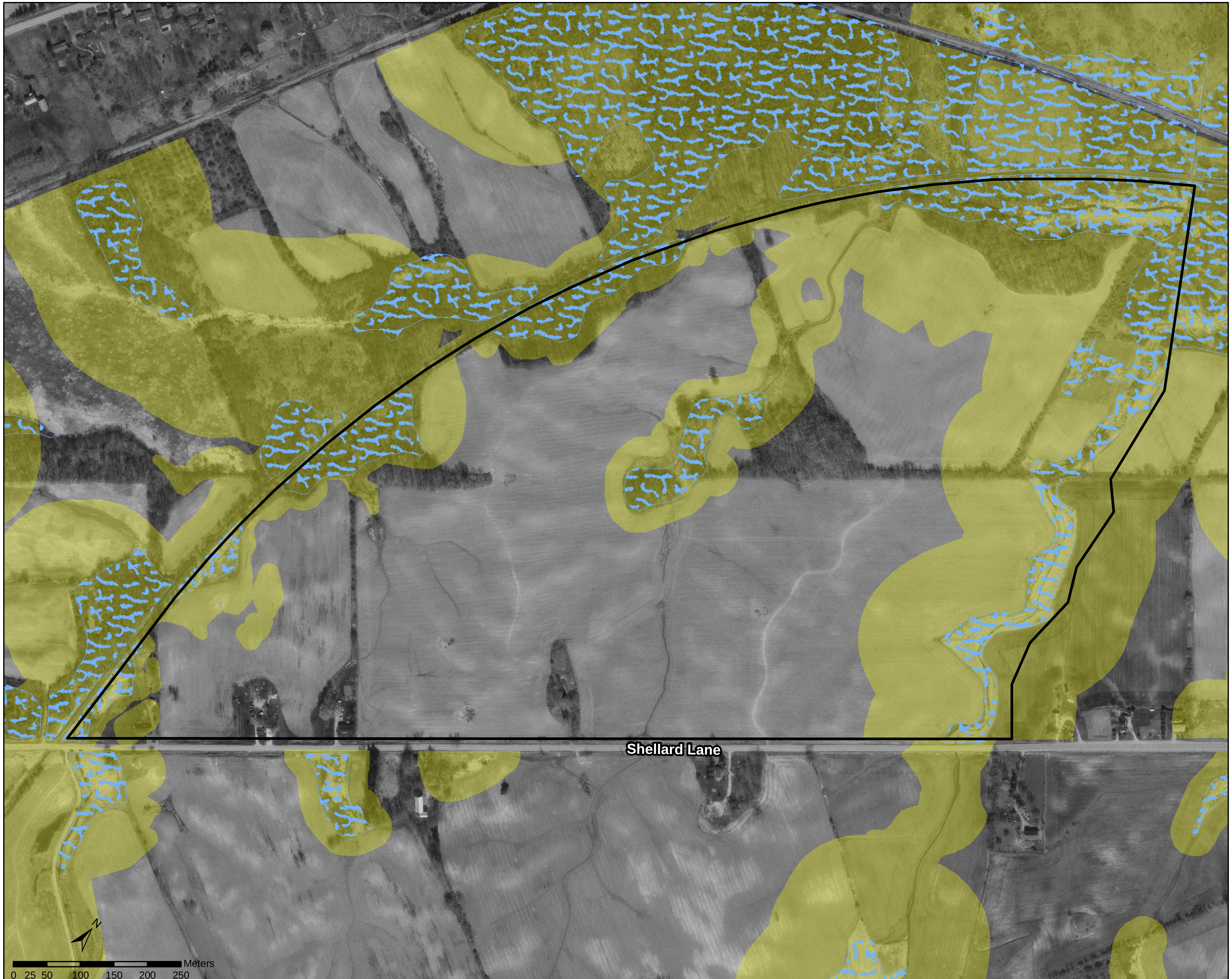
Waterdown, ON
L0R 2H3

North of Shellard Lane Neighbourhood & Recreation Plan

Preferred Concept Plan

Project #	2010-30	Figure # 5
Date	June 2011	
Scale	1 : 5,500	
Prepared By: JJJ	Verified By: BDB	



Legend

- Study Area
- Provincially Significant Wetlands
- Regulation Limits

PLAN B Natural Heritage
Landscape Ecology & Natural Heritage Planning

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Waterdown, ON
L0R 2H3

North of Shellard Lane
Neighbourhood & Recreation Plan

Regulation Limits and PSWs

Project #	2010-30	Figure # 6
Date	June 2011	
Scale	1 : 5500	
Prepared By: JJJ	Verified By: BDB	

Legend

- Study Area
- Major Contour
- Minor Contour
- Slope Erosion
- Slope Valley

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L0R 2H3

North of Shellard Lane
Neighbourhood & Recreation Plan
Topography and Erosion

Project #	2010-30	Figure #	7
Date	June 2011		
Scale	1 : 5500		
Prepared By: JJJ	Verified By: BDB		

Legend

- Study Area
- Dripline (as staked 25 Nov. and 15 Dec. 2010 and 26 May 2011)
- Wetland Boundary (as staked 25 Nov. and 15 Dec. 2010 and 26 May 2011, with GRCA)
- Watercourse
- Estimated Dripline*
- Estimated Wetland Boundary*
- 5 Frog Call Monitoring Station Location

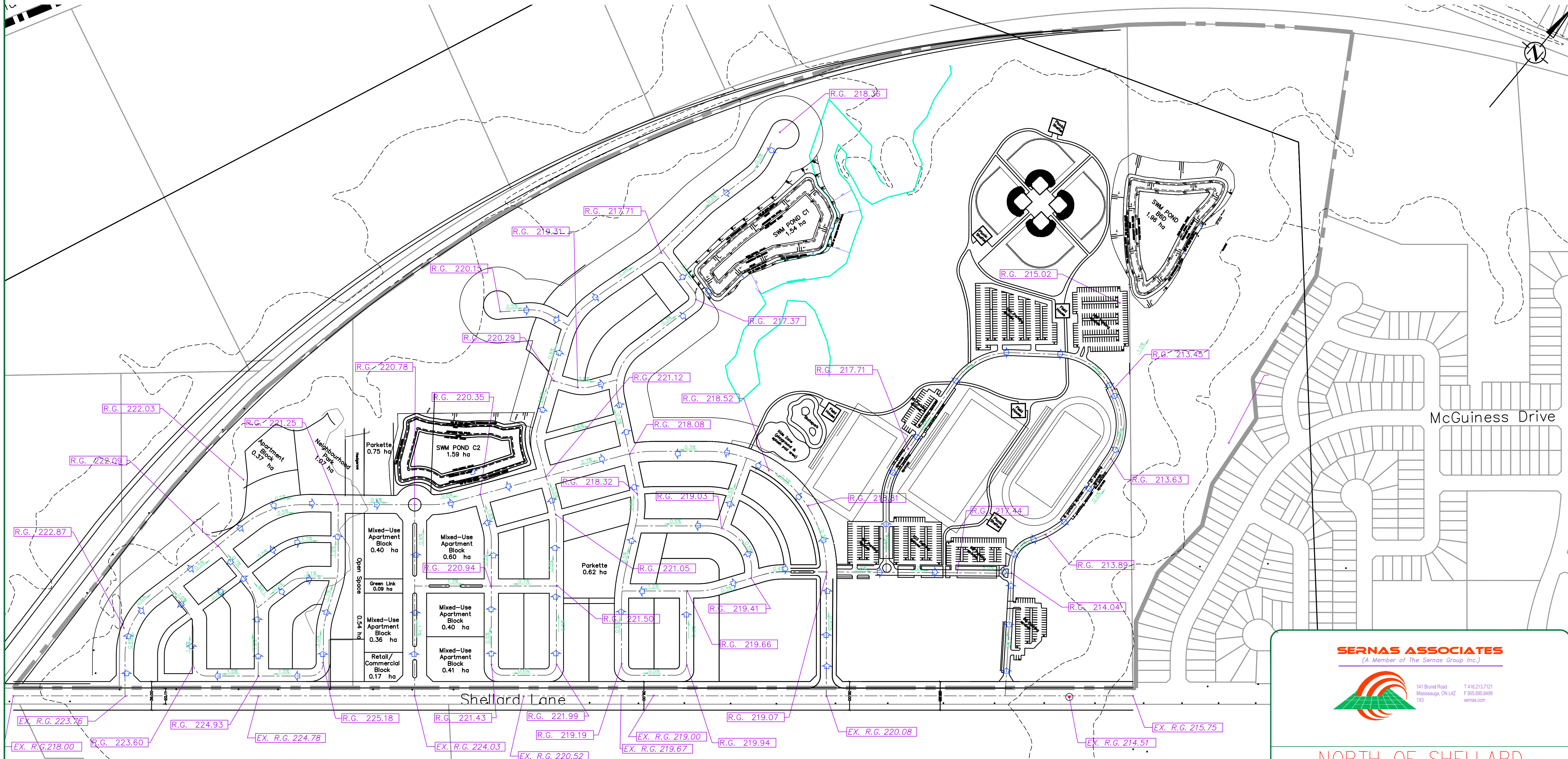
* Estimations based on airphoto interpretation

PLAN B Natural Heritage
Landscape Ecology & Natural Heritage Planning
176 Fellowes Crescent
Waterdown, ON
L0R 2H3

North of Shellard Lane
Neighbourhood & Recreation Plan
Frog Call Monitoring

Project #	2010-30	Figure # 8
Date	June 2011	
Scale	1 : 5,500	
Prepared By: JJJ	Verified By: BDB	

E. Servicing



LEGEND

	PROPOSED STORM SEWER AND MANHOLE (WITH FLOW DIRECTION)
	PROPOSED SANITARY SEWER AND MANHOLE (WITH FLOW DIRECTION)
	PROPOSED WATERMAIN
	EXISTING WATERMAIN
	EXISTING STORM SEWER
	EXISTING SANITARY SEWER
	OVERLAND FLOW DIRECTION
0.50%	PROPOSED ROAD GRADE
R.G. XXX.XX	PROPOSED ROAD ELEVATION
Ex. R.G. XXX.XX	EXISTING ROAD ELEVATION
STM XXX.XXX	STORM SEWER OBVERT
Ex. STM. XXX.XXX	EXISTING STORM SEWER OBVERT
SAN XXX.XXX	SANITARY SEWER OBVERT
Ex. SAN. XXX.XXX	EXISTING SANITARY SEWER OBVERT

SERNAS ASSOCIATES
(A Member of The Sernas Group Inc.)

NORTH OF SHELLARD NEIGHBOURHOOD & REC

FUNCTIONAL GRADING PLAN

DRAWN BY : L.O.	PROJECT No. 10306
DESIGNED BY : D.B.	
CHECKED BY : S.W.	DRAWING No.
SCALE 1:5000	FIGURE 1

R/P Date – SEPT. 20, 2011 File: 10306-FGR.DWG

Preliminary Cost Estimate
North of Shellard Neighbourhood
Sanitary Collection System
Alternative 1 - Outlet to Sub-Trunk on McGuiness Drive

Item No.	**Description**	**Est. Quan.**	**Unit**	**Unit Price[1,2]**	**Amount**
1.0	Sub-trunk extension, from current limit to Collector Road (Street 1)				
1.1	375 mm pipe sewer, 5-7 m depth	665	m	$360	$239,400
1.2	Extra-over the unit price for Item 1.1, to cross Tributary E by trenchless Methods		LS		$75,000
2.0	Local pipe sewers by open cut, no restoration				
2.1	300 mm, on Street 1, 7-9 m depth	185	m	$390	$72,150
2.2	300 mm, on Street 1, 5-7 m depth	380	m	$320	$121,600
2.3	300 mm, on Street 1, 3-5 m depth	708	m	$260	$184,080
2.4	200 mm, 5-7 m depth	150	m	$265	$39,750
2.5	200 mm, 3-5 m depth	4180	m	$290	$1,212,200
Sub-total					$1,944,180
Contingency Allowance					$194,420
Engineering Allowance					$320,790
Sub-Total - Construction					$2,459,390
HST (@13%)					$319,721
Total - Alternative 1 Sanitary Collection System					$2,779,000

Note: *1. Unit Price includes pipe sewer plus allowance for appurtenances*
2. No Dewatering allowance included

Preliminary Cost Estimate
North of Shellard Neighbourhood
Sanitary Collection System
Alternative 1B - Outlet to Sub-Trunk on McGuiness Drive, including Lands West of Rail Trail

Item No.	Description	Est. Quan.	Unit	Unit Price[1,2]	Amount
1.0	Sub-trunk extension, from current limit to Collector Road (Street 1)				
1.1	375 mm pipe sewer, 5-7 m depth	665	m	$360	$239,400
1.2	Extra-over the unit price for Item 1.1, to cross Tributary E by trenchless Methods		LS		$75,000
2.0	Local pipe sewers by open cut, no restoration				
2.1	300 mm, on Street 1, 7-9 m depth	565	m	$390	$220,350
2.2	300 mm, on Street 1, 5-7 m depth	400	m	$320	$128,000
2.3	300 mm, on Street 1, 3-5 m depth	308	m	$260	$80,080
2.4	200 mm, 5-7 m depth	150	m	$265	$39,750
2.5	200 mm, 3-5 m depth	4180	m	$290	$1,212,200
3.0	Local sewer extension on Shellard Lane, including road restoration and traffic control				
3.1	300 mm pipe sewer, 5-7 m depth	80	m	$570	$45,600
3.2	300 mm pipe sewer, 3-5 m depth	120	m	$490	$58,800
Sub-total					$2,099,180
Contingency Allowance					$209,920
Engineering Allowance					$346,370
Sub-Total - Construction					$2,655,470
HST (@13%)					$345,211
Total - Alternative 1 Sanitary Collection System					$3,001,000

Note: *1. Unit Price includes pipe sewer plus allowance for appurtenances*
2. No Dewatering allowance included

Preliminary Cost Estimate
North of Shellard Neighbourhood
Sanitary Collection System
Alternative 2 - Outlet on Shellard Lane

Item No.	Description	Est. Quan.	Unit	Unit Price[1,2]	Amount
1.0	Trunk extension, from current limit to Collector Road (Street 1), including road restoration and traffic control				
1.1	375 mm pipe sewer, 5-7 m depth	310	m	$540	$167,400
1.2	Extra-over the unit price for Item 1.1, to cross Tributary E by trenchless methods		LS		$175,000
2.0	Local pipe sewers by open cut, no restoration				
2.1	300 mm, on Collector, 7-9 m depth	250	m	$390	$97,500
2.2	300 mm, on Collector, 5-7 m depth	240	m	$320	$76,800
2.3	300 mm on Collector, 3-5 m depth	783	m	$260	$203,580
2.4	200 mm, 5-7 m depth	150	m	$265	$39,750
2.5	200 mm, 3-5 m depth	4180	m	$290	$1,212,200
Sub-total Construction					$1,972,230
Contingency Allowance					$197,220
Engineering Allowance					$325,420
Sub-Total - Construction					$2,494,870
HST (@13%)					$324,333
Total - Sanitary Collection System					$2,819,000

Note: *1. Unit Price includes pipe sewer cost plus allowances for appurtenances*
2. No Dewatering allowance included

Preliminary Cost Estimate
North of Shellard Neighbourhood
Sanitary Collection System
Alternative 2, Outlet on Shellard Lane, Including Lands West of Rail Trail

Item No.	Description	Est. Quan.	Unit	Unit Price[1,2]	Amount
1.0	Trunk extension, from current limit to Collector Road (Street 1), including road restoration and traffic control				
1.1	375 mm pipe sewer, 7-9 m depth	900	m	$660	$594,000
1.2	375 mm pipe sewer, 5-7 m depth	310	m	$540	$167,400
1.3	300 mm pipe sewer, 5-7 m depth	80	m	$500	$40,000
1.4	300 mm pipe sewer, 3-5 m depth	120	m	$410	$49,200
1.5	Extra-over the unit price for Item 1.1, to cross Tributary E by trenchless methods		LS		$175,000
2.0	Local pipe sewers by open cut, no restoration				
2.1	300 mm, on Collector, 7-9 m depth	250	m	$390	$97,500
2.2	300 mm, on Collector, 5-7 m depth	240	m	$320	$76,800
2.3	300 mm on Collector, 3-5 m depth	783	m	$260	$203,580
2.4	200 mm, 5-7 m depth	150	m	$265	$39,750
2.5	200 mm, 3-5 m depth	4180	m	$290	$1,212,200
Sub-total Construction					$2,655,430
Contingency Allowance					$265,540
Engineering Allowance					$438,150
Sub-Total - Construction					$3,359,120
HST (@13%)					$436,686
Total - Sanitary Collection System					$3,796,000

Note: *1. Unit Price includes pipe sewer cost plus allowances for appurtenances*
2. No Dewatering allowance included

Preliminary Cost Estimate
North of Shellard Neighbourhood
Water Distribution System

Item No.	Description	Est. Quan.	Unit	Unit Price[1,2]	Amount
1.0	Trunk extension, from current limit on Shellard Lane to Collector Road (Street 1), including road restoration and traffic control				
1.1	400 mm pipe	900	m	$460	$414,000
1.2	Extra-over the unit price for Item 1.1, to cross Tributary E by trenchless methods		LS		$100,000
2.0	Local watermains by open cut, no restoration				
2.1	300 mm, on Collector	1115	m	$390	$434,850
2.2	200 mm	2400	m	$265	$636,000
2.3	150 mm	1935	m	$290	$561,150
Sub-total Construction					$1,732,000
Contingency Allowance					$173,200
Engineering Allowance					$285,780
Sub-Total - Construction					$2,190,980
HST (@13%)					$284,827
Total - Water Distribution System					$2,476,000

Note: *1. Unit Price includes pipe watermain cost plus allowances for appurtenances*
2. No Dewatering allowance included

Preliminary Cost Estimate
North of Shellard Neighbourhood
Water Distribution System, including Secondary Feed from McGuiness Drive

Item No.	Description	Est. Quan.	Unit	Unit Price[1,2]	Amount
1.0	Trunk extension, from current limit on Shellard Lane to Collector Road (Street 1), including road restoration and traffic control				
1.1	400 mm feedermain	900	m	$460	$414,000
1.2	Extra-over the unit price for Item 1.1, to cross Tributary E by trenchless methods		LS		$100,000
2.0	Local watermains by open cut, no restoration				
2.1	300 mm	1115	m	$390	$434,850
2.2	200 mm	2400	m	$265	$636,000
2.3	150 mm	1935	m	$290	$561,150
3.0	Secondary feed from McGuiness Drive				
3.1	300 mm watermain	550	m	$290	$159,500
3.2	Extra-over the unit price for Item 1.1, to cross Tributary E by trenchless methods		LS		$75,000
3.3	Restoration of McGuiness Drive		LS		$10,000
Sub-total Construction					$1,976,500
Contingency Allowance					$197,650
Engineering Allowance					$326,120
Sub-Total - Construction					$2,500,270
HST (@13%)					$325,035
Total - Water Distribution System					$2,825,000

Note: *1. Unit Price includes pipe watermain cost plus allowances for appurtenances*
2. No Dewatering allowance included

F. Sports Campus Detailed Budget

North of Shellard Lane Sports Campus
Preliminary Cost Estimate
July 6, 2011

Item #	Description	Quantity	Unit		Unit Price		Total	Notes
1	**Site Preparation**							
1.1	**North Portion**							
1.1.1	Clearing and Grubbing	46722	m2	$	3.00	$	140,166.00	Tree and Shrub Removal
1.1.2	Rough Grading	19608	m3	$	5.00	$	98,040.00	Preparation for Road, Parking Lot and Ball Fields
1.1.3	Storm Water Management	1	Lump Sum	$	300,000.00	$	300,000.00	Cisterns, Catch Basins and Pipe
1.1.4	Sanitary	1	Lump Sum	$	100,000.00	$	100,000.00	Service for Field House and Picnic Shelters
1.1.5	Water	1	Lump Sum	$	30,000.00	$	30,000.00	Water Service for Drinking Fountains, Picnic Shelter, Field House and Irrigation System
1.1.6	Electrical	1	Lump Sum	$	60,000.00	$	60,000.00	Wiring, conduit and electrical panel(s) - no fixtures
					Site Preparation North Portion	$	728,206.00	
1.2	**South Portion**							Not Including School / Community Centre / Library Site
1.1.1	Clearing and Grubbing	81108	m2	$	3.00	$	243,324.00	Tree and Shrub Removal
1.1.2	Rough Grading	35722	m3	$	5.00	$	178,610.00	Preparation for Road, Parking Lot and Fields
1.1.3	Storm Water Management	1	Lump Sum	$	400,000.00	$	400,000.00	Cisterns, Catch Basins and Pipe
1.1.4	Sanitary	1	Lump Sum	$	100,000.00	$	100,000.00	Service for Field House, Picnic Shelter and Water Play
1.1.5	Water	1	Lump Sum	$	60,000.00	$	60,000.00	Water Service for Drinking Fountains, Water Play, Picnic Shelter, Field House and Irrigation System
1.1.6	Electrical	1	Lump Sum	$	120,000.00	$	120,000.00	Wiring, conduit and electrical panel(s) - no fixtures
					Site Preparation South Portion	$	1,101,934.00	
					Site Preparation	**$**	**1,830,140.00**	
2	**Play Fields (Football, Soccer and Rugby)**							
2.1	**Field #1: 400m Asphalt Track & Field (110 x 55)**							
2.1.1	Field #1: Soccer Field (110 x 55)	1	Lump Sum	$	250,000.00	$	250,000.00	including 10 metre buffer, earthworks, drainage, irrigation and fencing
2.1.2	Lighting	8	Each	$	20,000.00	$	160,000.00	
2.1.3	400 metre Asphalt Track with 8 Lanes	1	Lump Sum	$	450,000.00	$	450,000.00	
2.1.4	Spectator seating	1	Lump Sum	$	150,000.00	$	150,000.00	
2.1.5	Score Board	1	Lump Sum	$	5,000.00	$	5,000.00	Assuming 20" height multi-score board visible from 600ft
2.1.6	Equipment Storage Building	1	Lump Sum	$	150,000.00	$	150,000.00	
					Field #1	$	1,165,000.00	
2.2	**Field #2: Football and Rugby Field (140 x 70)**							
2.2.1	Field #2: Football and Rugby Field (140 x 70)	1	Lump Sum	$	800,000.00	$	800,000.00	CFL Regulation Size, Artificial Turf, including 10 metre buffer. Includes earthworks, drainage, irrigatio
2.2.2	Lighting	8	Each	$	20,000.00	$	160,000.00	
2.2.3	Fencing	460	LM	$	200.00	$	92,000.00	
2.2.3	Score Board	1	Lump Sum	$	5,000.00	$	5,000.00	Assuming 20" height multi-score board visible from 600ft
2.2.4	Spectator seating	1	Lump Sum	$	75,000.00	$	75,000.00	
					Field #2	$	1,132,000.00	
2.3	**Field #3: Soccer Field (110 x 55)**							
2.3.1	Field #3: Soccer Field (110 x 55)	1	Lump Sum	$	250,000.00	$	250,000.00	including 10 metre buffer, earthworks, drainage, lighting, irrigation and fencing
2.1.2	Lighting	6	Each	$	20,000.00	$	120,000.00	
2.3.2	Score Board	1	Lump Sum	$	5,000.00	$	5,000.00	Assuming 20" height multi-score board visible from 600ft
2.3.3	Spectator seating	1	Lump Sum	$	15,000.00	$	15,000.00	
					Field #3	$	390,000.00	
					Play Fields	**$**	**2,687,000.00**	

3 Softball Fields

3.1 Softball Field #1

3.1.1 Softball Field #1 (65 metres centre field)	1	Lump Sum	$	250,000.00	$	250,000.00	Includes drainage, lighting, irrigation and fencing
3.1.2 Lighting	6	Each	$	20,000.00	$	120,000.00	
3.1.3 Score Board	1	Lump Sum	$	5,000.00	$	5,000.00	Assuming 20" height multi-score board visible from 600ft
				Field #1	$	375,000.00	

3.2 Softball Field #2

3.2.1 Softball Field #2 (65 metre centre field)	1	Lump Sum	$	250,000.00	$	250,000.00	Includes drainage, lighting, irrigation and fencing
3.2.2 Lighting	6	Each	$	20,000.00	$	120,000.00	
3.2.3 Score Board	1	Lump Sum	$	5,000.00	$	5,000.00	Assuming 20" height multi-score board visible from 600ft
				Field #2	$	375,000.00	

3.3 Softball Field #3

3.1.1 Softball Field #1 (65 metres centre field)	1	Lump Sum	$	250,000.00	$	250,000.00	Includes drainage, lighting, irrigation and fencing
3.1.2 Lighting	6	Each	$	20,000.00	$	120,000.00	
3.1.3 Score Board	1	Lump Sum	$	5,000.00	$	5,000.00	Assuming 20" height multi-score board visible from 600ft
				Field #1	$	375,000.00	

3.4 Softball Field #4

3.1.1 Softball Field #1 (65 metres centre field)	1	Lump Sum	$	250,000.00	$	250,000.00	Includes drainage, lighting, irrigation and fencing
3.1.2 Lighting	6	Each	$	20,000.00	$	120,000.00	
3.1.3 Score Board	1	Lump Sum	$	5,000.00	$	5,000.00	Assuming 20" height multi-score board visible from 600ft
				Field #1	$	375,000.00	
				Ball Fields	**$**	**1,500,000.00**	

4 Skate park

4.1 Skate park

4.1.1 Concrete Surface	1280	m2	$	110.00	$	140,800.00
4.1.2 Portable Equipment	1	Lump Sum	$	50,000.00	$	50,000.00
4.1.3 Shade Structure	1	Lump Sum	$	80,000.00	$	80,000.00
4.1.4 Drinking Fountain	1	Lump Sum	$	5,000.00	$	5,000.00
4.1.5 Lighting	1	Lump Sum	$	35,000.00	$	35,000.00
4.1.6 Seating	5	Each	$	2,500.00	$	12,500.00
4.1.7 Garbage Receptacles	2	Each	$	1,000.00	$	2,000.00
4.1.8 Bicycle Parking	15	Each	$	500.00	$	7,500.00
				Skate park	**$**	**332,800.00**

5 Community Playground

5.1 Junior Playground

5.1.1 Rubber Safety Surface	867	m2	$	200.00	$	173,400.00
5.1.2 Play Structure	1	Lump Sum	$	50,000.00	$	50,000.00
5.1.3 Lighting	1	Lump Sum	$	11,600.00	$	11,600.00
5.1.4 Seating	3	Each	$	2,500.00	$	7,500.00
5.1.5 Garbage Receptacles	1	Each	$	1,000.00	$	1,000.00
5.1.6 Bicycle Parking	20	Each	$	500.00	$	10,000.00
				Junior Playground	$	253,500.00

5.2 Tot Lot Playground

5.1.1 Rubber Safety Surface	378	m2	$	200.00	$	75,600.00
5.1.2 Play Structure	1	Lump Sum	$	50,000.00	$	50,000.00
5.1.3 Lighting	1	Lump Sum	$	11,600.00	$	11,600.00
5.1.4 Seating	6	Each	$	2,500.00	$	15,000.00
5.1.5 Garbage Receptacles	1	Each	$	1,000.00	$	1,000.00
				Tot Lot Playground	$	153,200.00

5.3 Splash Pad

5.3.1 Concrete Surface	261	m2	$	110.00	$	28,710.00
5.3.2 Splash Pad Equipment	1	Lump Sum	$	150,000.00	$	150,000.00
5.3.3 Shade Structure	1	Lump Sum	$	80,000.00	$	80,000.00
5.3.4 Lighting	1	Lump Sum	$	50,000.00	$	50,000.00
5.3.5 Seating	8	Each	$	2,500.00	$	20,000.00
5.3.6 Garbage Receptacles	2	Each	$	1,000.00	$	2,000.00
5.3.7 Bicycle Parking	15	Each	$	500.00	$	7,500.00
				Splash Pad	$	338,210.00
				Community Playground	**$**	**744,910.00**

6	**Field Houses**						
6.1	**North Field House**						
6.1.1	Facilities Pavilion	1	Lump Sum		750000 $	750,000.00	Includes washroom, change facilities, equipment, storage and concessions
					North Field House $	750,000.00	
6.2	**South Field House**						
6.2.1	Facilities Pavilion	2	Lump Sum		750000 $	1,500,000.00	Includes washroom, change facilities, equipment, storage and concessions
					South Field House $	1,500,000.00	
					Field Houses $	**2,250,000.00**	
7	**Picnic Shelters**						
7.1	**North Picnic Shelter 1**						
7.1.1	Concrete Pad	293	m2	$	85.00 $	24,905.00	
7.1.2	Shelter Structure	1	Lump Sum	$	100,000.00 $	100,000.00	
7.1.3	Sink including hookup to water and sanitary	1	Lump Sum	$	25,000.00 $	25,000.00	
7.1.4	Picnic Tables	6	Each	$	2,500.00 $	15,000.00	
7.1.5	Garbage Receptacles	4	Each	$	1,000.00 $	4,000.00	
					North Picnic Shelter 1 $	168,905.00	
7.2	**North Picnic Shelter 2**						
7.2.1	Concrete Pad	293	m2	$	85.00 $	24,905.00	
7.2.2	Shelter Structure	1	Lump Sum	$	100,000.00 $	100,000.00	
7.2.3	Sink including hookup to water and sanitary	1	Lump Sum	$	25,000.00 $	25,000.00	
7.2.4	Picnic Tables	6	Each	$	2,500.00 $	15,000.00	
7.2.5	Garbage Receptacles	4	Each	$	1,000.00 $	4,000.00	
					North Picnic Shelter 2 $	168,905.00	
7.2	**South Picnic Shelter**						
7.2.1	Concrete Pad	293	m2	$	85.00 $	24,905.00	
7.2.2	Shelter Structure	1	Lump Sum	$	100,000.00 $	100,000.00	
7.2.3	Sink including hookup to water and sanitary	1	Lump Sum	$	25,000.00 $	25,000.00	
7.2.4	Picnic Tables	6	Each	$	2,500.00 $	15,000.00	
7.2.5	Garbage Receptacles	4	Each	$	1,000.00 $	4,000.00	
					South Picnic Shelter $	168,905.00	
					Picnic Shelters $	**506,715.00**	
8	**Trail Head**						
8.1	**Trail Head #1**						
8.1.1	Concrete Pad	100	m2	$	85.00 $	8,500.00	
8.1.2	Notice Board / Map Structure	1	Lump Sum	$	5,000.00 $	5,000.00	
					Trail Head #1 $	13,500.00	
8.2	**Trail Head #2**						
8.2.1	Concrete Pad	100	m2	$	85.00 $	8,500.00	
8.2.2	Notice Board / Map Structure	1	Lump Sum	$	5,000.00 $	5,000.00	
					Trail Head #2 $	13,500.00	
8.3	**Trail Head #3**						
8.2.1	Concrete Pad	100	m2	$	85.00 $	8,500.00	
8.2.2	Notice Board / Map Structure	1	Lump Sum	$	5,000.00 $	5,000.00	
					Trail Head #3 $	13,500.00	
					Trail Heads $	**40,500.00**	

9 Parking

9.1 North Parking Lots

9.1.1 Permeable Pavers	12232	m2	$	100.00	$	1,223,200.00	
9.1.2 Concrete Curbs	652	linear Metre	$	55.00	$	35,860.00	
9.1.2 Lighting	56	Each	$	5,000.00	$	280,000.00	Barrier Curb
9.1.3 Landscaped Parking Islands / Bio Swales	1161	m2	$	200.00	$	232,200.00	Spaced at 20 metres O.C.
9.1.4 Signage	1	Lump Sum	$	4,000.00	$	4,000.00	Assumed Tree spacing 8m and seeded grasses
				North Parking Lot	$	1,775,260.00	

9.2 South Parking Lots

9.2.1 Permeable Pavers	11342	m2	$	100.00	$	1,134,200.00	
9.2.2 Concrete Curbs	971	linear Metre	$	55.00	$	53,405.00	Including Line Painting
9.2.3 Lighting	48	Each	$	5,000.00	$	240,000.00	Roll curb to permit boulevard parking
9.2.4 Landscaped Parking Islands / Bio Swales	660	m2	$	200.00	$	132,000.00	Spaced at 20 metres O.C.
9.2.5 Signage	2	Lump Sum	$	4,000.00	$	8,000.00	
				South Parking Lot	$	1,567,605.00	

9.3 West Entrance Road

9.3.1 Asphalt	1498	m2	$	50.00	$	74,900.00	Including Line Painting
9.3.2 Concrete Curbs	428	linear Metre	$	55.00	$	23,540.00	Roll curb to permit boulevard parking
9.3.3 Landscaping	620	m2	$	200.00	$	124,000.00	Assumed Tree spacing 8m and seeded grasses
9.3.4 Lighting	20	Each	$	5,000.00	$	100,000.00	Spaced at 20 metres O.C.
9.3.5 Gateway Feature	1	Lump Sum	$	15,000.00	$	15,000.00	
				Entrance Road	$	337,440.00	

9.4 South Entrance Road

9.4.1 Asphalt	1048	m2	$	50.00	$	52,400.00	Including Line Painting
9.4.2 Concrete Curbs	262	linear Metre	$	55.00	$	14,410.00	Roll curb to permit boulevard parking
9.4.3 Landscaping	1160	m2	$	200.00	$	232,000.00	Assumed Tree spacing 8m and seeded grasses
9.4.4 Lighting	14	Each	$	5,000.00	$	70,000.00	Spaced at 20 metres O.C.
				West Connector Road	$	368,810.00	

9.5 East Connector Road

9.5.1 Asphalt	2880	m2	$	50.00	$	144,000.00	Including Line Painting
9.5.2 Concrete Curbs	720	linear Metre	$	55.00	$	39,600.00	Roll curb to permit boulevard parking
9.5.3 Landscaping	1344	m2	$	200.00	$	268,800.00	Assumed Tree spacing 8m and seeded grasses
9.5.4 Lighting	36	Each	$	5,000.00	$	180,000.00	Spaced at 20 metres O.C.
				East Connector Road	$	632,400.00	

9.6 North Connector Road

9.6.1 Asphalt	2312	m2	$	50.00	$	115,600.00	Including Line Painting
9.6.2 Concrete Curbs	578	linear Metre	$	55.00	$	31,790.00	Roll curb to permit boulevard parking
9.6.3 Landscaping	978	m2	$	200.00	$	195,600.00	Assumed Tree spacing 8m and seeded grasses
9.6.4 Lighting	30	Each	$	5,000.00	$	150,000.00	Spaced at 20 metres O.C.
				North Connector Road	$	492,990.00	

9.7 Connector Road to North and East Road

9.7.1 Asphalt	944	m2	$	50.00	$	47,200.00	
9.7.2 Concrete Curbs	236	linear Metre	$	55.00	$	12,980.00	Barrier Curb
9.7.3 Landscaping	250	m2	$	200.00	$	50,000.00	Spaced at 20 metres O.C.
9.7.4 Lighting	11	Each	$	5,000.00	$	55,000.00	Assumed Tree spacing 8m and seeded grasses, including soil mix
				Connector Road to North and East Road	$	165,180.00	
				Parking Lot and Roads	**$**	**5,339,685.00**	

10 Landscaping

10.1 North Fields

10.1.1	Top Soil and Fine Grading	46722	m2	$	3.00	$	140,166.00
10.1.2	Tree Planting (tree clusters and allees on walkways)	47	each	$	750.00	$	35,250.00
10.1.3	Naturalization Seed Mix	30226	m2	$	2.00	$	60,452.00
10.1.4	Asphalt Trail	7666	m2	$	45.00	$	344,970.00
10.1.5	Walkways	1062	m2	$	100.00	$	106,200.00
10.1.6	Walkway Lighting	59	Each	$	3,000.00	$	177,000.00
					North Fields Landscaping	$	864,038.00

10.2 South Fields

10.2.1	Top Soil and Fine Grading	81108	m2	$	3.00	$	243,324.00	Includes general landscaping, grading, topsoil, trees and walkways.
10.2.2	Tree Planting (tree clusters and allees on walkways)	178	each	$	750.00	$	133,500.00	
10.2.3	Naturalization Seed Mix	43594	m2	$	2.00	$	87,188.00	
10.2.4	Asphalt Trail	5038	m2	$	45.00	$	226,710.00	
					South Fields Landscaping	$	690,722.00	

10.3 School / Community Centre / Library

10.3.1	Landscaping	9952	m2	$	200.00	$	1,990,400.00
					School / Community Centre / Library Landscaping	$	1,990,400.00
				Landscaping		**$**	**3,545,160.00**

NORTH of SHELLARD
NEIGHBOURHOOD + RECREATION PLAN

G. Demonstration Plan

North of Shellard Lane Neighbourhood + Recreation Plan

Preferred Plan

The **Planning** Partnership
September, 2011